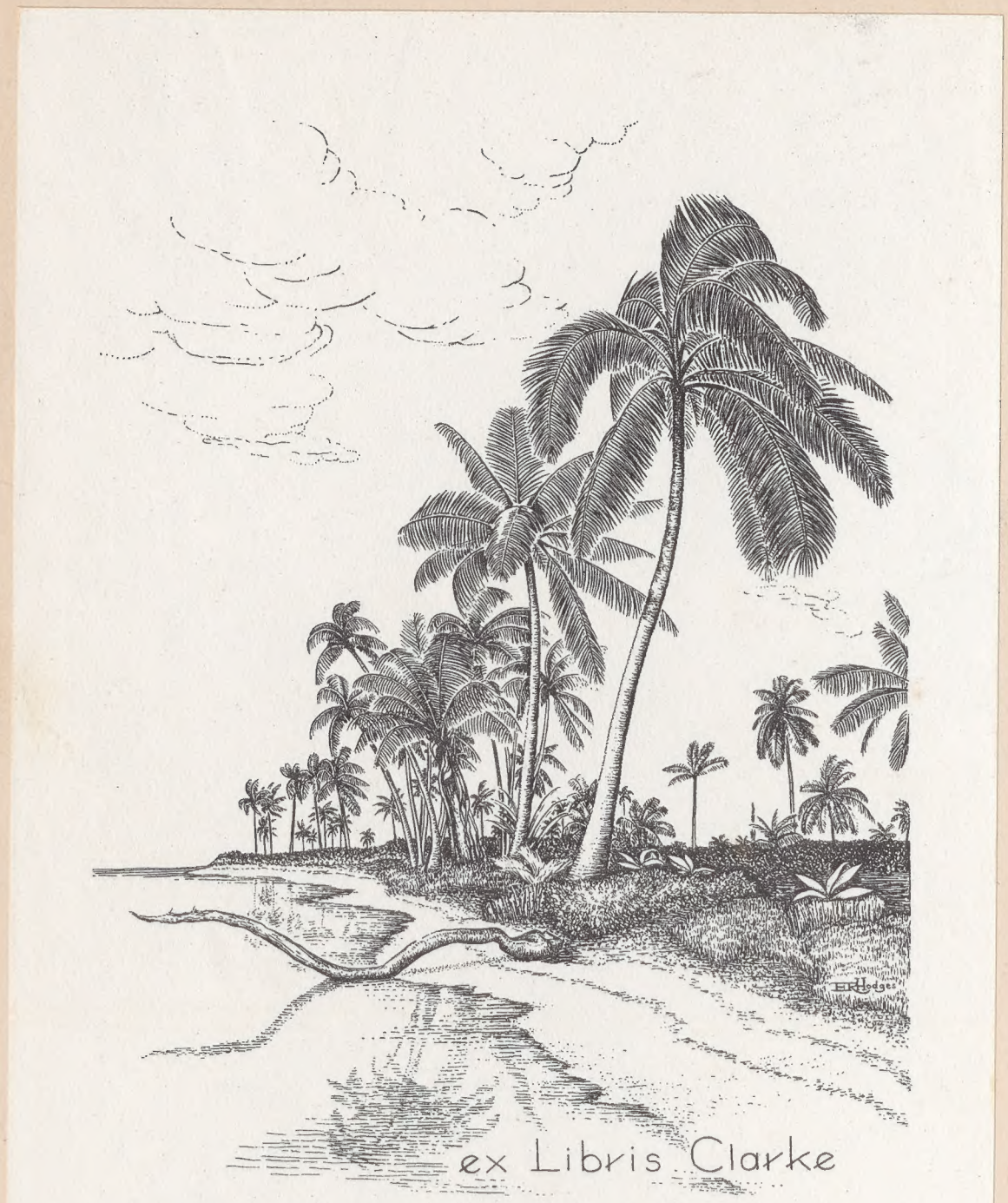

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PAPILIO:

THE ORGAN OF THE

NEW YORK ENTOMOLOGICAL CLUB.

Devoted Exclusively to Lepidoptera.

VOLUME I.

EDITED BY

HENRY EDWARDS.

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PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] January 15, 1881. [No. 1.

In issuing the first number of PAPILIO, as the organ of the "New York Entomological Club," it is the hope of its projectors that it will meet a want hitherto felt among students, and prove its claims to favorable consideration.

It will be devoted solely to Lepidoptera, the constitution of the Club being such that the other orders of insects may receive special investigation and publication, when the time arrives for more extended fields of labor.

PAPILIO will be issued about the fifteenth of each month (except during the two midsummer months), the subscription price being $2 per annum.

Most of the distinguished entomologists of the United States, among whom may be mentioned Dr. H. Hagen, Dr. Packard, S. H. Scudder, W. H. Edwards, Dr. H. Behr, R. H. Stretch, Prof. Lintner, etc., have approved the objects of the Club and promised their valuable assistance.

Subscriptions and communications should be addressed to Mr. HENRY EDWARDS, 185, East 116th Street, New York City.

A. R. GROTE,
HY. EDWARDS,
T. L. MEAD,
} *Publication Committee.*

NEW YORK, January, 1881.

ON THE IMPORTANCE OF ENTOMOLOGICAL STUDIES.

From an address recently made to the Farmers' Club of Onondaga County, by Prof. J. A. LINTNER, State Entomologist of New York.

"Occasionally, at the present day, we may hear insects and entomologists spoken of as 'bugs' and 'bug-hunters'—epithets applied in derision to what are regarded as petty objects and trivial pursuits. Such views only betray an ignorance which is equally pitiable and inexcusable. The study of insects has assumed an importance in its direct application to agriculture, horticulture and sylviculture, second to no other department of natural

history. It has called to its aid some of the best intellect of the country. Its literature has become extensive and assumed a high rank. Our State governments, in response to demands made upon them, are appointing State Entomologists. Our General Government is making liberal appropriations for entomological work in the Department of Agriculture at Washington, and also for sustaining a special United States Entomological Commission, now in the third year of its operations, charged with the investigation of a few of our more injurious insects.

"The study of insects assumes an importance in this country far greater than in any other part of the world. Nowhere else does mother earth yield in such variety and in such abundance her agricultural products; after supplying to repletion our own people, the excess is distributed to every quarter of the globe. Few, surprisingly few, of these varied products are native to our soil. Nearly all of our fruits, grasses, cereals and vegetables, and perhaps three-fourths of our weeds are of foreign importation—mainly from Europe. With their introduction, very many of the insects that preyed upon them were also introduced, or have been subsequently brought hither. But unfortunately for us, the parasites which preyed upon them and kept them under control, have, for the most part, been left behind. As the result, the imported pests, in their new home, find their favorite food-plants spread out in luxuriant growth over broad acres, where they may ply their destructive work without hinderance or molestation, until some native parasites acquire the habit of preying upon them.

"The grand scale upon which our crops are grown as no where else in the world—demanding for their gathering the invention of special mechanical contrivances, and that horse-power should be replaced by steam—has also as its attendant inevitable evil, an enormous increase of insect depredations. This may be illustrated by a reference to our apple-tree insects. * * * * * * "In like manner, any and every crop cultivated on a large scale offers strong invitation to insect attack, and wonderfully stimulates insect multiplication."

ON TWO NEW FORMS OF THE GENUS PARNASSIUS.

By Henry Edwards.

(*Read before the New York Entomol. Club, at the first meeting in December*, 1880.)

In my paper on Parnassius (Proc. Cal. Acad. Sc. 1878), I referred to a singular example sent to me from the Upper Yukon river, Alaska, which I then hesitated to describe, but which, by the advice of many entomologists, I now characterise as follows:

Parnassius Thor. Hy. Edw. n. sp.

Head, anterior portion of thorax above, and the whole of the

lower side, base of the tibiæ, and under side of abdomen thickly clothed with bright golden yellow hairs. There are also a few scales of the same color at the base of the costa of the primaries and along the sides of the abdominal segments. Antennæ and tarsi jet black, the latter with some yellow hairs at their base.

Upper side: Ground color sordid white, as in *P. Clarius* Evers., and *P. Delphius* Evers.

Primaries with the posterior margins broadly smoky and slightly transparent. Above the margin is a row of equal lunate white marks, then a moderately broad blackish band, narrowing a little at the interior margin, then a whitish maculate band, broadest on the internal margin and reduced to a spot on the costa. Anterior to this is a sinuate row of white spots, six in number, not reaching the internal margin, which is whitish at the base, dotted with black atoms, as is also the costa. Base of the wing blackish, the cell with one large ovate, and one oblong white spot. The system of markings of the primaries recalls that of the genus Thais, and is different from any other Parnassius known to me.

Secondaries: Base and anal margin broadly black, the markings being very clearly cut around the upper portion of the cell, leaving a well-defined ovate white space. From the anal angle up to the second sub-costal nervure runs a wide black band, enclosing at the anal angle one small round and one lunate red spot. Between the second sub-costal and the discoidal nervures is an almost conical red patch, and below it a small round spot, also red. On the centre of the costa is a triangular red spot, surrounded with black. The submarginal lunules are very sharp and distinct, as indeed are all the markings, and the fringes of both wings are deep, intense black.

Under side: Resembling the upper, but the markings are a little fainter, and the wings have the glassy appearance so often found on the genus. The secondaries have four red spots at the base—the one on the costa small and almost linear, the second nearly square, the third triangular, and the fourth oblong. The other red spots have their centres white.

Expanse of wings, 2. 10 inch.

Type. Coll. Hy. Edwards.

This exquisite and very interesting insect was taken about 800 miles up the Yukon river, Alaska, by Mr. F. W. Smith, of San Francisco, and by him kindly added to my collection. In some respects it approaches closely to *P. Eversmanni* Men., but differs from the figure of that species given by Mr. W. H. Edwards, in the *Butterflies of North America*, not only in the color, which is remarkably distinct, but in the broader black base of the primaries, the wider bands, and the much larger proportion of black

on both wings. The red spots, too, are more numerous, those of the anal angle and the base of the costa of secondaries being wanting in Mr. Edwards' figure. As the present form, however, comes from nearly the same locality as the type from which that figure is taken, it may ultimately prove to be an extreme variety of *P. Eversmanni*. It is, however, so distinct to be considered for the present as a separate species.

PARNASSIUS HERMODUR. n. var.

♀ A remarkable variety of *P. Smintheus* Dbly., which approaches very closely *P. Corybas*, Fisch, from the Altai. The whole upper surface of the primaries is of a smoky black hue, slightly transparent, the usual bands being lost in the ground color of the wing. In this respect it nearly resembles *P. Corybas*, but the latter, as well as two red spots near the costa, has also another near the internal margin, which is absent in the present form. The red spots of secondaries are nearly the same in both, but in *P. Hermodur* there is a trace of some red scales near the anal angle, which is wanting in *P. Corybas*. The black sub-marginal lunules of secondaries are also much more strongly marked in *P. Corybas* than in *P. Hermodur*, and the wing is whiter and more opaque. On the other side the resemblance is more apparent, the red spots on the costa, and that between the sub-costal nervures having white centres in both forms, while those of the base are wholly red, and alike in their color and arrangement. The present insect is smaller than its ally, the expanse being only 2.30 inch, while the pair of *P. Corybas* in my collection measure 2.65 inch.

Southern Colorado.

Type. Coll. Hy. Edwards.

This extremely interesting insect was generously given to me by my friend, Dr. James S. Bailey, of Albany. I have named it after the son of Odin and Freija, and the Mercury of the Scandinavian mythology.

DESCRIPTION OF FOUR NEW SPECIES OF MOTHS.

BY A. R. GROTE.

(*Read before the N. Y. Ent. Club, at the first meeting in December*, 1880.)

SCEPSIS EDWARDSII. n. sp.

This form is stouter than *fulvicollis*, with paler forewings and approaches *Echeta albipennis*, H.-S. from Cuba.

Forewings pale, slaty brown, with a whitish cast; the costal edge pale yellow, which shade extends faintly within the edge, from the middle outwardly, and obtains beneath, over apical third of costa.

Secondaries hyaline with broad smoky costal border, and narrow smoky external edging.

Beneath, primaries bluish black; secondaries hyaline with bluish costal border.

Head behind, palpi, base of fore legs orange. Thorax, pale,

slaty brown; collar touched with orange; abdomen metallic blue above, white beneath; legs white inwardly. *Expanse* 38 mm.

Indian River, Fla. Collection of Mr. Hy. Edwards, after whom this interesting species is named.

PARASA FRATERNA, n. sp.

This differs from *chloris*, which is evidently Reakirt's *viridus*, by the absence of the brown dark spot on the terminal brown marginal band of primaries, and by the greater width of that band, and the narrowness of the green median band. Else the species are very similar, but the difference is striking in comparison. *Fraterna* is slighter than its ally, and the larva, found by Mr. Tepper, is quite distinct from that of *chloris*, as I am informed by Mr. Tepper. Thorax and vertex green; hindwings yellowish at base, with darker border; fore wings with an inwardly oblique median green band, not extending over costal edge, and reaching to the base of the wing along internal margin. N. Y., Mass., Mr. Roland Thaxter; also in Mr. Tepper's collection.

MAMESTRA SUTRINA, n. sp.

This species is similarly sized with the Californian *cuneata*, but a little slighter-bodied. It is deep brown, cut and lined with white and wants all yellowish markings, and is thus differently colored from its ally. It differs in markings by the absence of the dots following the t. p. line, and by the white lunulate s. t. line. Lines double, filled in with white. Reniform and orbicular subequal, approximate, white-ringed. Claviform outlined in black, beyond it a white spot. A dark line upon submedian fold. Median lines lunulate, uneven, approaching inferiorly. Black interspaceal marks precede the white s. t. line. Half-line marked; t. a. line nearly perpendicular, marked by a black outer line and preceding white shade; t. p. line outwardly bent above, drawn in below vein 4, well removed outwardly. Beneath fuscous; hind wings irrorate with whitish, with discal dot and transverse line; above, secondaries with darker border and slightly paler base. Eyes hairy; body tufted. *Expanse* ♂ 30 mm. Colorado.

CATACOLA DULCIOLA, n. sp.

A new species of Catocala (I do not now think we have to do with a variety), has been collected by my friend, G. R. Pilate, of Dayton, Ohio, in his neighborhood. It is of the size of *crataegi* and has its paler color; it is pale greenish gray, the primaries with a slight reflection recalling, *praeclara*. It is intermediate between *alabamae* and *crataegi*. It differs by the anterior line, forming a moderate arc, being more even and without the usual indentation on vein 1. The lines are black, the t. p. line fine. The veins are marked with black over the terminal space. The median shade is indicated by a dentate black costal mark, a black basal dash. The basal space is darker than the rest of the

wing, while the depth of the terminal coloring leaves the large median space of the primaries pale and contrasting, reminding us a little of *C. cordelia*. The hind wings are dark yellow, with the wide black median band connected with the base, and resemble those of *polygama*. Five or six examples, all alike, have been collected by Mr. Pilate, of this interesting form, which I call *C. dulciola*. The female type before me expands 44 millimetres.

ON THE EARLY STAGES OF SOME MOTHS.

By D. W. Coquillett, Woodstock, Ill.

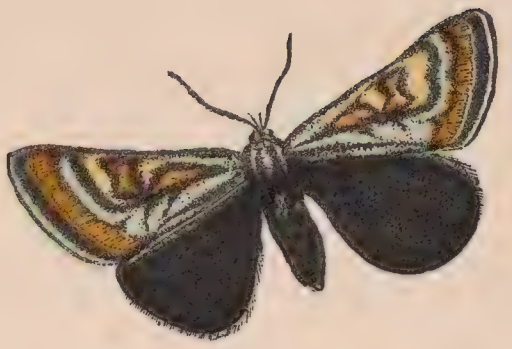
The larvæ described below are provided with 16 legs, except the last one, which has only 12:

Apatela americana, Harris.—Body greenish white; a subdorsal and stigmatal black line; on top of the last two segments is a black stripe which widens posteriorly; body thickly covered with short pale yellow hairs; on top of segments 4 and 6 are two pencils, and on top of segment 11 is a single pencil, of very long black hairs; venter black; head shining black; length 2½ inches. One specimen taken on a red-oak tree August 13; on the 19th of the same month it spun in one of the upper corners of its breeding cage a large cocoon, interwoven with the hairs with which its body was covered; the imago emerged on the 24th of May of the following year.

Apatela lobeliæ, Guenée.—Body bluish gray, the dorsal space tinged with yellow; a dorsal and subdorsal pale yellowish line extending only to segment 11 which is humped, the top blueish, and on it are four quite large piliferous spots, top of segment 4 bluish, interrupting the dorsal line; piliferous spots whitish, prominent, each bearing a black hair; sides of the body quite thickly covered with whitish hairs; spiracles white, encircled with black; venter, greenish white; head, gray, dotted with black, and marked on the top with two blood-red spots; length 1½ inches. One specimen found June 6, on a burr oak tree; it spun a cocoon June 22, disclosing the imago July 14.

Apatela falcula, Grote.—Body, dark brown, mottled with pale greenish; a dark dorsal line, on each side of which are two rows of prickles, most distinct on anterior part of body; the four prickles on top of segment 11 are larger and placed closer together than those on the segments anterior to it; from each of these prickles proceeds or two short black hairs; venter, greenish white; sides of head pale greenish, the face brownish; length, 1¼ inches. One specimen found on hazel, September 25, entered the earth and spun a thin cocoon September 29, disclosing the imago May 25 of the following year.

Apatela superans, Guenée.—Body green; a reddish brown dorsal stripe, edged with yellow; in the middle of this



Edwardsia Brillians, NEUMOEGEN.

stripe is a light line on each side of which is a zigzag row of small prickles from each of which issues one or two black or whitish hairs; on each side of the body are a a few small prickles from each of which issues a thin cluster of whitish hairs; a whitish stigmatal line; segment 11 slightly humped; head large, the sides pale green, the face reddish brown, sometimes tinged with pink; length 1¼ inches. One specimen was found upon a plum-tree, July 26; it entered the earth and spun a tough cocoon, August 8, producing the imago, May 12, of the following year. Another specimen was found upon a cherry-tree; it assumed the chrysalis form, August 31, disclosing the imago, May 25, of the following year.

ARCTIA VIRGUNCULA, Kirby.—Body black; hair in spreading clusters from black warts; the hair in the region of the spiracles is reddish brown, the rest black; head shining black; length 1½ inches. Feeds on knot grass (*Polygonum aviculare*). One specimen found April 28, spun a thin cocoon June 10, disclosing the imago June 27.

CATOCALA FRATERCULA, Grote and Robinson.—Body ashen gray, the dorsal space dark gray, and on its outer edge is a row of black pilferous spots; on top of segment 8 is a conical dark gray projection, tipped with whitish; posterior part of segment 8 blackish; venter pale greenish white with a row of black spots in the middle, one spot to each segment; the two anterior pairs of abdominal legs are much smaller than the two posterior pairs; head light gray, bordered on the top and sides with black; length 1¾ inches. One specimen found on a burr oak tree, spun its cocoon June 1, disclosing the imago June 28.

CATOCALA AMICA, Hübner.—Body slender, dull greenish yellow, a light dorsal stripe, on each side of which is a darker stripe on which is a row of black piliferous spots; a stigmatal row of black piliferous spots; on top of segment 8 is a slight prominence; venter greenish white, with a row of black spots in the middle, one spot to each segment; the two anterior pairs of abdominal legs are smaller than the two posterior pairs; head gray, with two white spots on upper part of face; length 1¼ inches. Found two specimens on a burr oak tree, June 5; they spun cocoons about July 3, disclosing the imagoes July 24.

MAMESTRA TRIFOLII, Rott.—Body green; a dark dorsal line; a white stigmatal line; piliferous spots not visible; venter green, unmarked, head pale green; length nearly 1 inch. One specimen found upon *Chenopodium album*, July 5, entered the earth the next day, disclosing the imago July 23.

EUSTROTIA CARNEOLA, Guenée.—Body green, usually very dark, the subdorsal space sometimes tinged with blackish; a white dorsal line sometimes edged with black; a white subdor-

sal and stigmatal line; a row of white dots on dorsal and subdorsal spaces; venter green, unmarked; head green; length ¾ inch. Feeds on yellow dock. A dozen or so of these larvæ issued from eggs June 2; they spun thin cocoons beneath chips, etc., from June 18, to 21, producing the imagoes, July 4 to 7.

PYRRHIA ANGULATA, Grote.—Body bluish white; a yellowish brown stigmatal stripe; from the stigmatal stripe on one side of the body to that on the other side are about 10 black lines; sometimes a dorsal row of about 7 yellowish brown spots; piliferous spots, black; venter pale greenish; head shining yellow, with a black dot on each side near the jaws, the jaws sometimes black; length, 1½ inches. Several specimens found upon smartweed (*Polygonum Pennsylvanicum*), September 15; they entered the earth about three inches and formed oval cells, September 27, disclosing the imagoes May 22, and a few days afterward.

TARACHE ERASTRIOIDES, Guenée.—Body deep green; a white stigmatal stripe; body marked with 16 or 18 wavy black or white lines, or with 12 white lines; venter green, marked with 7 or 8 white lines; head green, striped with white, or marked with black and white; length, 1 inch. Several specimens found on ragweed (*Ambrosia artemisifolia*), July 11; they entered the earth (date not known), disclosing the imagoes about May 22 of the following year.

"NORTH-AMERICAN TORTRICIDÆ."

BY LORD WALSINGHAM, London, 1879.

This work, in quarto, with 17 colored plates, forms Part IV. of the "Illustrations of typical specimens of Lepidoptera Heterocera in the collection of the British Museum," and "deals exclusively with the North American Tortricidæ in the National collection."

The value of Lord Walsingham's work can be best appreciated by the specialist, and when we consider that it completes the work of Robinson and Fernald in identifying Mr. Walker's types in that group, we should be willing to consider its value great. But it goes further than this, and gives a fair illustration of our Western Tortricidæ from material collected by the author in California and Oregon. In addition, a list is given of all the species which are common to Europe and North America. These latter are forty-eight in number, a seemingly large percentage of the species known. Thanks to the labors of Robinson, Zeller, Fernald, and Walsingham (I name them in the order of priority), our North American Tortricidæ are becoming better known and classified, so that they are being brought into correspondence with the European catalogues. This has been my aim with the

Noctuidæ, although in this larger group I can hardly hope to accomplish what Lord Walsingham has completed in the Tortricidæ, namely, the finding out what all Mr. Walker's descriptions really covered. With every assistance it has been a difficult task for Lord Walsingham, and in cases where more than one species has been included by Mr. Walker under the same name, perhaps the last word has not been said. In any event, while it must be acknowledged that, aside from the question of synonymy, Mr. Walker's work was not worth preserving, it must be conceded that Lord Walsingham's setting has given it a permanent value, and that so far as the North American Tortrices are concerned, the question what we are to do with Mr. Walker's descriptions has been satisfactorily answered.

With regard to the new material figured and described there is much of interest. The remarkable new form, *Synnoma lynosyrana*, with its unusually dissimilar sexes is a case in point. The new species of *Cenopis*, then *Lophoderus triferana*, *Paedisca crambitana* and *Proteopteryx emarginana* are all strange and interesting forms. In describing *Lozotaenia retana*, however, Lord Walsingham has renamed *houstonana*, and his *Cenopis gracilana* is a synonym of *sulfureana*.

The lithographic plates are good without being excellent. The drawing is a little stiff, but the coloring has been carefully done. The plates are, on the whole, perhaps, better than Robinson's, while they want the enlarged detail of Zeller's illustrations. But as they are in the same style as Robinson's, they are best compared with these, and they add much to the value of a work one of the main purposes of which is a ready identification of the species it discusses.

A. R. GROTE.

ON A NEW SPECIES OF ARCTIA FROM FLORIDA.

BY B. NEUMOEGEN.

ARCTIA FLAMMEA. n. sp.

Head, antennæ, palpi, eyes, patagiæ and thorax of dark black color; antennæ serrated and moderate; palpi hairy; abdomen black; above with a broad, double dorsal line of brilliantly red color, segmentarily serrated; beneath dark black, with slight indications of a dotted red lateral line; legs black; anterior coxæ reddish below.

Primaries deep velvety black, a little pointed towards apex, with concolorous fringes; markings of cream color, intermixed with light red, as follows: two longitudinal lines of irregularly shaped, square dots, starting from sub-costal nervure, the interior one following straight to median nervure; thence, somewhat diverted from its course, down to inner angle of interior margin, looking like a straight line bent in the middle, and dividing the space between

costa and exterior margin, into an irregular, triangular field. The anterior line of dots, starting near apex, not parallel to interior line, but diverting from its course and striking the exterior margin at conjunction of second discoidal nervule. These two longitudinal lines are connected by a horizontal bar of very narrow, irregular dots, following the course of second discoidal nervule. The connecting dot of horizontal and anterior longitudinal lines, near exterior margin, is of furcate shape, and the whole appearance of the shorter anterior and longer interior lines, intercepted by the vertical bar, strikingly resembles the figure 4. An irregular cream colored spot in discal area.

Secondaries intensely red, with black fringes, and broad, black marginal band from base to somewhat beyond anal angle. A large black reniform spot, starting from costa rests on median nervule. A small longitudinal line of irregular black spots from costa, near apex, reaches to second sub-costal nervule, without touching the marginal band, and leaves a small interspace of red. Resting on marginal band, near anal angle, are two irregular, triangular shaped black spots, connected above by a small black line, thus forming a small square space of red color.

Beneath the markings on primaries and secondaries are the same, with the exception that those on former are of a light rose, instead of cream color.

Expanse of wings, 1.75 inches.

Length of body, 0.75 inch.

The insect is readily distinguishable from the other members of its group by the striking contrast of the dark black primaries and thorax, the flaming red color of its secondaries and upper part of abdomen, and the sparse disposition of the markings and lines, usually so abundant in North American Arctians.

Habitat: Indian River, Florida. Collected by Dr. Wissfeld, season of 1880.

Type, ♀; coll., B. Neumoegen.

NEW YORK, December 24th, 1880.

THE NORTH AMERICAN SPECIES OF EUSTROTIA.

BY A. R. GROTE.

(*Read before the N. Y. Ent. Club, at the first meeting in December.*)

The species of *Eustrotia* differ from *Thalpochares*, among other characters, by the presence of an accessory cell on the primaries. Lederer divides the species in two groups according as the abdomen is provided with tufts over the dorsal region or not. In A the abdomen is untufted; in B tufted. The European catalogues give us ten species. I refer the following fifteen species from North America to the genus, for which latter I re-

tain the Hübnerian term *Eustrotia*, for the reason that *Erastria* had been employed for a genus of Geometridæ by Hübner before it came to be used for the present group by the Viennese Entomologists. The synonymy of our species is not much embroiled. I have not been able to examine all of them as carefully as I wish, for of some I have only single examples which I cannot denude. I entertain but little doubt, however, that they are all correctly referred to this genus. Mr. Morrison has described *E. mariæ* as *Hadena norma* and again as *Lithacodia penita*.

GROUP A.

Malaca *Grote*, Trans, Am. Ent. Soc. 4, 96 (*Erastria*).
Mitographa *Grote*, Trans. Am. Ent. Soc. 4, 96 (*Erastria*).
Albidula *Guen.*, Noct. 2, 230 (*Erastria*).
Secta *Grote*, Can. Ent., 11, 199; id., 12, 50.

GROUP B.

Concinnimacula *Guen.*, Noct. 2,238, Pl. 10, fig. 10 (*Leptosia*); Grote, Check List (*Eustrotia*). *var.* parvimacula *Grote*, N. Am. Ent. 1, 66.
Synochitis *G. & R.*, Trans. Am. Ent. Soc. 1, 357 (*Erastria*); Grote Bull. B. S. N. S., 2, 37 (*Eustrotia*).
Musta *G. & R.* Trans. Am. Ent. Soc. 4, 358 (*Erastria*); Grote Bull. B. S. N. S. 2, 37 (*Eustrotia*).
Muscosula *Guen.*, Noct. 2, 230 (*Erastria*); Grote, Bull. B. S. N. S. 2, 37 (*Eustrotia*).
Carneola *Guen.*, Noct. 2, 228 (*Erastria*); Grote, Bull. B. S. N. S. 2, 37 (*Eustrotia*); *biplaga* Walk., Noct. 809.
Apicosa *Haw.* Steph. Haust. 3, 119 (*Erastria*); Grote Bull. B. S. N. S. 2, 199 (*Eustrotia*); Wood Index 74, Pl. 17, fig. 464; *Erastria nigritula* Guen., Noct. 2, 229, Pl. 10, fig. 7; *Miana undulifera* Walk., Noct. 258.
Retis *Grote*, Can. Ent. 11, 198.
Caduca *Grote*, Can, Ent. 8, 207.
Mariæ *Grote*, Can. Ent. 9, 67.
Aeria *Grote*, n. sp.
Dividua *Grote*, N. Am. Ent. 1, 46.

EUSTROTIA AERIA n. sp.

This species is about the size of *dividua* with the colors of *apicosa*. Head and collar black. Fore wings pale ochry or rusty fuscous. The lines and spots are not obvious. The costa at base is marked with black. The median shade line is black and is broadly black on the costal region. A large sub-quadrate black patch on costal region between the t. p. and s. t. lines. An oblique apical black mark. Hind wings pale fuscous, beneath still paler with indistinct discal spot and double lines. One specimen, Racine. Wisc., Dr. Hoy.

DESCRIPTIONS OF TWO NEW SPECIES OF LITHOSIDÆ.

By Henry Edwards.

NOLA ANFRACTA. n. sp.

Ground color of primaries, olive brown, with white shades. Basal space olivaceous—t. a. line broad slightly sinuate, whitish, shaded with greyish on the edges, enclosing a darker line in its centre. Median space also olivaceous, darkest in the centre of the wing. T. p. line shaded as the anterior line, and also enclosing a dark line in its centre. The t. p. line runs obliquely from the interior margin, nearly to the apex, where it turns very suddenly upwards, and reaches the costa about the middle. It is brownish at its costal end, and rests on a white blotch. There are also four other triangular white blotches between its termination and the apex. The margin is broadly silvery white, and between it and the t. p. line is a pale olivaceous space. Apex with a small brown dot, and there are six others at the termination of the nervules. Secondaries, smoky white, with a faint discal spot, and the ends of the nervules brown. Under side, smoky white, with a faint discal spot darkest on costa of primaries, where are faint indications of two broken bands. The secondaries are the same as on the upper side. Head, palpi, thorax, tibiæ and tarsi slightly dusky.

Expanse of wings, 0.80 inch.

1 ♂. Yosemite Valley, California.

Type. Coll. Hy. Edwards.

CROCOTA OSTENTA. n. sp.

Head and thorax, fawn color, with an orange tint—the latter with the collar and patagia narrowly red. Palpi, tarsi, tibiæ, and under side of abdomen fawn color. Abdomen above, black, with red lateral streak. Eyes large, black. Primaries, wholly dull orange, paler and brighter on the costa. Secondaries with their costal half bright crimson, the other half velvety black, widest at the anal angle. Under side—primaries bright crimson, same color as the costal half of secondaries. Secondaries the same as in the upper side.

Expanse of wings, 1.35 inch.

1 ♂. Prescott, Arizona. W. Howard.

The most showy and remarkable species of the genus.

THE ILLUSTRATION OF EDWARDSIA BRILLIANS.

The beautiful insect represented in the colored plate is Edwardsia brillians, Neum. It was described in the *Can. Entomologist*, April, 1880, from a specimen captured in N. W. Texas, by the late Jacob Boll. The type is in the collection of Mr. B. Neumoegen.

PAPILIO.

Organ of the New York Entomological Club.

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A NEW INSECT INJURIOUS TO THE HICKORY.

By A. R. Grote.

In my paper on Pyralidæ, published by the United States Geological Survey, I called attention to the injuries caused by several species of the *Phycidae* to our forest trees. Our pines are attacked by species of the genus *Pinipestis*; the history of *P. Zimmermani*, which attacks also imported pines and should be noticed by Nurserymen, has been somewhat fully worked out. The following species are found to attack our hickories (*Carya*).

Acrobasis Caryae, n. s.

♂ The maxillary palpi untufted, the antennæ ciliate, with a sub-basal flexure and a scale-tooth on the thickly scaled basal joint. Shining grayish fuscous; the head and thorax concolorous. Smaller than *Angusella*, without the carneous shadings and reddish thorax and head. Outer line of primaries pale, narrow and faint. Inner line a ridge of raised darker scales narrowly edged outwardly by a pale, flesh-colored shade. The wing is paler, more grayish, at base. The color shifts with the light. Discal points faint. In ornamentation this species is inconspicuous. Hind wings as usual blackish; fringes interlined, concolorous. Length of primary wing, 9 mil. Reared by Mr. Coquillett from larvæ on *Carya Porcina;* the larvæ has been found "boring into the twigs."

Mr. Coquillett describes the larva and chrysalis as follows:

Acrobasis Caryae, *Grote.*

Body subcylindrical, smooth, pale greenish ash; a pale brown subdorsal dot on each side of segment 2; a wavy-fold below the spiracles; the latter are encircled with a dark brown ring, and there is a brown piliferous dot above each; a few whitish hairs on each side of the body; top of segment 1 polished, yellowish green; head narrower than segment 1, heart shaped, dark brown; venter pale green, unmarked; 16 legs; length, 14 mm. Found

May 21, burrowing in the branches of the Pignut Hickory (*Caryæ Porcina*) usually selecting the lower branches; imagoes about June 22. *Chrysalis.*—Of the usual form, pale brown, rounded at the posterior end, at which place there is a cluster of about 4 slender hooked spines; length, from 7 to 8 mm. The larva spins a thin web around the footstalks of the leaves which grow near the terminal end of the branch, and then burrows into the terminal bud and the wood of the present year's growth. It webs its castings together and forms a short tube which projects outward from the mouth of its burrow, and is closed at the outer end. The larva probably assumes the chrysalis form in its burrow, but those which I reared deserted their burrows and spun tough cocoons beneath the litter in the bottom of the breeding-cage. These larvae are very subject to the attacks of parasites; from a small number which I collected I obtained three moths and two Hymenopterous parasites which Mr. E. T. Cresson determined to be the *Phanerotoma Tibialis* of Haldeman. One of these parasites issued June 21 and the other June 26.

ACROBASIS ANGUSELLA, Grote, N. Am. Ent. 1, 51,

This species has a continuous black dash on the *underside* of the secondaries along costa. The thorax and base of forewings are dirty reddish. The transverse anterior line is curved; the posterior line is denticulate. The lines are oblique and uneven. In *A. Caryæ* they are perpendicular. *Acrobasis Angusella* has been reared by Mr. Akhurst from larvæ boring into the leaf stems of the hickory. The dash is less vivid in the following:

ACROBASIS DEMOTELLA, n. s.

♂ This species has a shorter black mark on secondaries beneath, not connected with the base of the wing, and a narrow basal streak along median vein. Forewing fuscous; base pale, stained with reddish, with an ashen shade on internal margin in place of the usual scale ridge. Outer line obliterate, pale, sinuate, not dentate as in *Angusella*, followed by a vague, reddish shade. Head and thorax whitish with a faint reddish tinge. Hind wings pale fuscous with paler fringes. *Expanse*, 24 mil. West Farms, Mr. Angus. This differs, as above noted, from *Angusella*, as a variety of which I considered it in my original description of that species. It must be considered distinct since *Angusella* has been reared by Mr. Akhurst, whose specimens agree with my type. The head and thorax are nearly white in *Demotella*, the larger and brighter of the two forms; the peculiar black dash on hind wings is not so bright and does not continue along costa to base. The habit of the larvæ of *Demotella* is unknown to me. In the *Phycidæ* it is necessary to have the male in order to correctly refer the species. No descriptions should be made from the female alone.

ON THE LARVÆ OF TWO NOCTUIDS.

By L. W. Goodell, Amherst, Mass.

Charadra propinquilinea, Grote.—Mature larva, one specimen; head round, slightly flattened in front, brown, smooth and glassy. Body thickest near the middle, tapering to each end, of a dirty white, with a large black spiracular spot on all the segments except the last two. It is covered with spreading tufts of short, stiff, white hairs, several of the hairs on the last two segments long and slender, extending over the end of the body. On each of the 4th and 11th segments situated close together, one behind the other, are two short pencils of light yellowish red hairs, and on the same segments, just below the hinder pencils, is another longer pencil of the same color. All the segments are thickest through the middle. My notes fail to give the length. Feeds on white birch, living in a sort of case made by folding a leaf or drawing two leaves together, and attaching them by their edges with silken threads. It changed to a pupa within its case September 20, and the imago emerged June 6.

Mamestra assimilis, Morr. Mature larva, one specimen. Head as wide as the first segment of the body; roundish, reddish horn color. Body smooth, thickest in the middle, tapering slightly to each end; dorsal space reddish brown, shading to dull red on the subdorsal; yellowish green beneath. There is a broad, straight, bright yellow dorsal stripe, with a narrow creamy white stripe adjoining it on each side; another narrower bright yellow spiracular stripe, with a creamy stripe adjoining it above and below, the latter edged outwardly with black. Length when at rest 27 mil.; when crawling 33 mil. Feeds on Golden Rod (Solidago). Pupated in the earth September 30, and the moth emerged May 29.

NEW PYRALIDÆ.

By A. R. Grote.

Cataclysta medicinalis, n. s.

The smallest species yet known to me, with different ornamentation from the *Fulicalis* group. Brown, ochery and white. A broad, inwardly oblique, silvery white sub-basal band continuing over hind wings. A white median patch followed by a curved white line. A white outwardly oblique band at apical third, nearly meeting a white band along external margin, stopping at the middle of the wing; an ochre shade between the median patch and the oblique costal band; external margin from apices downward margined by an ochre band, narrowly divided by a brown line of the color of the wing from the white exterior band; the brown basal patch includes an ochre

shade spot; the markings are continuous over hind wings at base; the large white subterminal field is sprinkled with brown scales; the terminal band is velvety black enclosing four or five gilt points; the edge of the wing is ochery, obtaining at apices; black scales extend from the terminal band beyond the gilt points, interrupting the ochre edging of the wing; beneath with the markings more faintly repeated; tegulæ striped with white. Expanse 12 mil., Carbondale, Illinois, Prof. French, in July. Smaller than Lederer's *opulentalis*, with very different secondaries. The ocelli are present.

CATACLYSTA HELOPALIS, *Clemens*, P. A. N. S. Phil., 217, 1860.

I have identified this species from specimens (N. Y.) in my collection. As stated by Clemens it differs from *C. Fulicalis* in having ocelli. In ornamentation and general appearance it is very like that species. It is a little larger, paler, with narrower inner line on secondaries, and there are a few obscure metallic points on the lower half of the external border on primaries. With this the small form *C. Medicinalis* agrees in having ocelli; but I can refer neither to the allied genera having ocelli. I have examined *C. Fulicalis* Clem., *C. Angulatalis* Led. (?) and *C. Bifascialis* Rob., in my collection, in all of which the ocelli are absent. These species may be arranged as follows. The neuration appears to differ in all the species.

CATACLYSTA, Hubner.

GROUP A, with ocelli, *Chrysendeton* m.

Medicinalis *Gr.* n. s.
Helopalis *Clem.*, Proc. A. N. S. Phil., 217, 1860.

GROUP B, without ocelli, *Cataclysta* Hub.

Fulicalis *Clem.*, Proc. A. N. S. Phil., 216, 1860.
Angulatalis *Led.*, Kaden in lit., 486, No. 132.
Bifascialis *Robinson*, Ann., N. Y. Lyc. N. H. Vol. ix. 154, Pl. 1, fig. 4.

I have not yet met with specimens of *C. Opulentalis* Led. Taf. 18, fig. 7 (which cannot be *Fulicalis*) or *Moniligeralis* Led., Taf. 18, fig 10. It is also not known to me under what names our species stand in the British Museum collection. The genera *Dicymolomia* (*Decora* Zell., from Texas, and either the same or an allied form from California) and *Chalcoela* (*Aurifera* Zell., and *Robinsonii* Gr.) belonging to our fauna, have also gilded dots on external margin of secondaries, but are structurally quite distinct from *Cataclysta*.

The following three described species of *Hydrocampa* are in my collection; the ocelli are present in all three forms.

GENUINALIS *Led.*, Taf. 18, fig. 2; *genuialis* Led. 483, No. 123.

PACALIS *Grote*, n. s.

EKTHLIPSIS *Grote*, Can. Ent, 8, 111.

DESIDERATUM.

? FORMOSALIS *Clem.*, P. A. N. S, Phil., 217, 1860.

HYDROCAMPA PACALIS, n. s.

Ocelli present. Fore wings pale ochre shaded with fuscous. A pale ochre costal median patch edged by the brown irregular and fragmentary median lines, and extending over the cell. A white brown ringed spot on submedian space. The outward median line forms an inward arcuation below costa and is interruptedly edged with white. The wide subterminal field shaded with fuscous. A brown line before the margin runs downward and then runs inwardly around anal angle. It is irregularly preceded by white shade spots, and is succeeded by a white brown-ringed spot on internal margin. The markings are repeated on hind wings where the brown lines enclosing the white median space are continuous, the outer line forming a superior extension and the white shading before the subterminal line is prominent and subcontinuous, not cut into spots as on primaries. Head and thorax dull ochre. Beneath, the markings more faintly repeated. *Expanse* 21 mil. N. Y. Less distinctly marked and quite different from *H. ekthlipsis*. Differing from *genuinalis* by the fuscous sprinkling of scales, the less distinct median lines, the straighter subterminal line of primaries with its obsolete white anterior shading, and the following white spot before anal angle.

PARAPONYX PLENILINEALIS, n. s.

♂ Ocelli. Maxillary palpi porrect. Male antennæ with the joints rather long and with a whorl of scales at the end of each joint. The antennæ clothed with sparse decumbent scales. White; forelegs blackish inwardly. Both palpi whitish; second joint of labial palpi fuscous outwardly. Thorax white, marked with black and fuscous scales on the shoulders; on the tegulæ behind and on the dorsum of the thorax in front. Forewings white, sprinkled with brown scales on the cell, evenly banded with yellowish and fuscous. Discal spot, a narrow black ringlet. Fringes outwardly gray; white at base, with a distinct series of black elongate, squarish spots, the fragments of a line, continued on hind wings. Outer edge of the wing yellowish fuscous, preceded by a narrow white line, and this by an even black line, all following the margin of the wing in shape. A broader white space before the black line, and followed by a yellowish fuscous, more darkly edged band beyond the outer transverse, white med-

ian band, which forms a wide curve and is indented on the fold, below which there is a shorter and thicker white band to internal margin. This white median band is followed by black scales, dilates on costa, where the black shadings on either side of it are more obvious. Median and basal spaces white; inner line, bent on cell, running inwardly obliquely below to internal margin. Hind wings white at base, with a black basal line, a median black line, a little uneven and joined to the black discal point; beyond the wing is again narrowly white before a yellowish fuscous dark-edged band, not quite attaining costa. On the white terminal space a black, irregular line, broken towards anal angle. Edge of the wing yellowish fuscous. Beneath fuscous, the lines feebly reflected. *Expanse* 18 mil. *Hab.* Wisc. in Sept., Mr. Westcott.

OLIGOSTIGMA OBSCURALIS, n. s.

Agrees with *Albalis* in having no ocelli, in the elongate wings and pattern of ornamentation. Fore wings thickly sprinkled with fuscous, the median lines obliterate. The outer line indicated by a pale, indistinctly continuous, costal included shade. A straight, interrupted, dark-brown line before the edge, continued to internal margin. Hind wings white, crossed by two even subparallel fuscous lines, the outer the broader, the latter followed by a narrow white space before a terminal ochre stripe along the margin, edged by fine broken brown lines. Beneath, dull and pale. Head and thorax above dark fuscous. *Expanse*, 22 mil. N. Y.; Wisc.; in September.

TORIPALPUS TRABALIS, n. s.

♂ ♀ Specimens from Colorado registered under this name in my collection, are much larger than *Breviornatalis* from Texas and Carolina. The inner line on primaries is more uneven. The outer line is denticulate, and strongly so below the median vein. The color is more brown and white. The female antennæ are simple; the male pectinate with basal tufts. *Expanse*, 31 mil. This form, while resembling its ally, is very different at first sight, from its greater size and contrasting colors, the median space of the wings distinctly powdery white anteriorly. Four specimens examined.

NEPHOPTERYX SCINTILLANS, n. s.

Hind wings 8-veined. Three internal veins. Median vein 4-branched; cell closed by a fold. Vein 2 thrown off before extremity of cell opposite the apex of the angulate fold; 5 running closely alongside of 4 and touching it just before the point of origin of 3; 6 to external margin just below apices; 7 and 8 separate to costa near apices. Fore wings 11-veined; cell straightly closed; 4 and 5 close together at base; 6 nearer to seven than to 5; 8 out of 7, both to costa beyond apices; 9 and 7 near together at base from s. c. vein; 11 from the vein well within the cell; 10

wanting. Ocelli. Tongue scaled. Maxillary palpi untufted, concealed in the male. Labial palpi with long second joint, extended in front, longer than the head. Male antennæ with a tuft within a basal flexure. The entire insect is blackish, immaculate, shining; head, thorax and primaries with violet reflections; the usual marking are lost; the fringes are but little paler, interlined. *Expanse*, 24 mil. A number of specimens from Summit, Sierra Nevada, collected by Mr. Hy. Edwards. In one specimen the darker, upright, waved median lines can be made out on primaries, and a discal point, but as a rule it is very difficult to perceive them.

NEW GENERA AND SPECIES OF NORTH AMERICAN NOCTUIDÆ.

By Henry Edwards.

EUROS. nov. gen.

Head small, deeply inserted in the thorax, which is densely clothed with appressed scales. Palpi, short, truncate, with rather short hairs. Abdomen extending beyond the wings, rather short, with small basal tuft. Antennæ simple. Tibiæ almost smooth, tarsi densely clothed with rather long hairs. The first pair very short, and furnished with a thickened process, terminating in a blunt spine; middle pair, long, with long spine, and the posterior pair with two short spines. Wings ample; the anterior pair about twice as long as the width; rounded at the apex.

This genus appears to be closely allied to Anarta, the form of the markings being somewhat similar, but the coloring of the primaries offers a very wide distinction, and the curious structure of the legs affords good characters for the formation of the present genus.

EUROS PROPRIUS, n. sp.

Primaries reddish brown, with all the lines and the margins of a deeper shade. Along the costal margin are some whitish scales. The basal half line, the t. a. and t. p. lines are dark-brown, the two latter very wide apart on costa, but approaching each other on the internal margin.

Reniform and claviform, yellowish brown, the latter unusually large. Submarginal line, sinuato-dentate, yellowish in color. Fringes reddish brown, darker at the extremity of the nervures. Secondaries, smoky black, with small white discal spot. Fringes, reddish brown. Underside, smoky black, broadly reddish brown along all the margins. Thorax, yellowish-brown, with reddish scales. Abdomen, smoky black, concolorous with the posterior wings.

Exp. wings. 0.75 inch.

1 ♂ Strawberry Valley, Siskiyou Co., Cal. Mrs. Hy. Edwards.

Type. Coll. Hy. Edwards.

LYGRANTHOECIA WALSINGHAMI. n. sp.

Allied to L. Separata Grote. Ground color of wings sordid white, Basal shade, light cinnamon brown, darkest posteriorly. Median space, clouded with crimson brown, heaviest towards the costa. T. a. and t. p. lines broadly bordered with white. Behind the t. p. line is a flexuous band of cinnamon brown reaching nearly to the apex. Margins whitish, clouded with brown. Fringes, alternately white and brown. Secondaries, sordid white, with a rather indistinct discal spot, and waved, submarginal band, fawn color. Fringes, white. Underside, wholly sordid white, with faint indications of reddish brown submarginal band and discal spot. Exp. wings, ♂ 0.70 inch. ♀ 1.00 inch. Klamath Lake, Oregon, Lord Walsingham, to whom I have much pleasure in dedicating this species. Type. Coll. Hy. Edwards.

ADONISEA PULCHRIPENNIS, Grote. Var. languida. Hy. Edw.

Whole upper surface thickly mottled with blackish scales, obscuring the beautiful violet crimson shade so conspicuous in the typical form. The bluish transverse lines are, however, very distinct, while the broken whitish band in front of the t. p. line is more strongly marked, by being thrown into greater contrast by the duller and darker ground color. Secondaries with the base and margins broadly black, enclosing a sub-lunate whitish space. Underside, sordid white. Margins of wings, except costa of secondaries (which is rosy), smoky black. Discal spots, large and distinct.

Havilah, Cal., R. H. Stretch. 1 ♂. Coll. Hy. Edwards. This form suggests the close relationship between Adonisea and the following genus.

MELICLEPTRIA BELLADONNA, n. sp.

Head and thorax covered with long brown hairs. Abdomen glossy black, with small dorsal tuft at the base, dark brown, the same shade as the hairs of the thorax. Primaries, rich brown, darkest towards the base, and along the internal margin. The discal field is whitish, with brown irrorations. The reniform and sub-reniform are very large, dark brown, almost black, narrowly edged with white. A blotch of the same dark color rests on the internal margin, and another of triangular shape touches the costa, near the apex of the wing. The t. p. line is blackish-brown, very narrow, and much curved anteriorly as it reaches the costa. Sub-marginal border, light brown. On the extreme margin is a row of brown triangular spots between the nervules. Fringes brown.

Secondaries broadly black at base, and on the margins, enclosing a large subovate white patch ; fringes brown, edged outwardly with white.

Under side : Primaries brownish black, as are the margins enclosing large cream white space ; reniform and sub-reniform black. Secondaries same as the upper side ; tibiæ black, with brownish hairs ; tarsi, sordid white. Exp. wings, 1.30 inch.

3 ♂ 2 ♂. Southern Utah.

Type. Coll. B. Neumoegen.

MELICLEPTRIA ELABORATA, n. sp.

Size of M. Villosa, Grote. Primaries with the base black, flecked with crimson and yellow scales, the costal edge crimson, with a linear white spot resting on the sub-costal nervure ; median band cream white, slightly sinuate posteriorly, and broken in front by a portion of the basal space, which here covers the central portion of the cell ; posterior third of the wing, bright rosy crimson, enclosing a clouded streak of black and yellow scales ; fringe yellowish white, except at the apex, where it is a brownish black. Secondaries black, with rather wide median band of cream white, broken in front by a small triangular black patch ; fringe cream white. Under side : Primaries rosy at base and apex ; a cream white band divided by a black spot ; internal half of the posterior portion, smoky black. Secondaries cream white, blackish along the anal margin, with the posterior half rosy, narrowly edged with black. Thorax covered with long golden hair ; the tegulæ shading into purplish rose color ; abdomen densely clothed with long yellow hairs, as are also the tibæ and tarsi. Exp. wings, 0.75 inch.

1 ♂ Colorado. H. K. Morrison.

Type. Coll. Hy. Edwards.

Probably the most beautiful of the genus, rivalling the exquisite Adonisea Pulchripennis, Grote.

MELICLEPTRIA PERMINUTA, n. sp.

Allied to M. Diminutiva, Grote, but much smaller and differing by the following characters. The primaries are dark brown, dotted with white scales, the macular band being composed of three spots, the largest being oblong, about the middle of the wing, and nearly touching the outer margin. Above this, in the anterior extremity of the cell, is a small roundish spot and a linear one in the median space, nearer to the t. p. line. In M. Diminutiva these spots assume the form of a band, and the ground color of the wing is redder, and wants the irrorated appearance of the present species. Secondaries black, with discal spot, and another near the anal margin, pure white. Underside black, primaries with wide median band and discal spot white.

Secondaries similar to the upper side. Exp. wing, 0.50 inch. Four examples. ♂. ♀. Bear Valley. Sier. Nev., Cal.

Types. Coll. Hy. Edwards.

ORIBATES, nov. gen.

A genus of small moths, having at first sight the appearance of Pyralidæ. The palpi are rather long, densely clothed with hairs; thorax moderately stout, vestiture hairy, passing into flattened scales, at the junction of the abdomen, which is somewhat extended beyond the posterior wings; legs clothed with closely appressed hairs; fore tibiæ unarmed in both sexes; the two posterior pair, each with a long spine; Antennæ simple-wings moderately broad, very much rounded on the apices.

ORIBATES MUIRII, n. sp.

Primaries dull orange, flecked with blackish scales, and the base shading into deep brown; in the central space there is also a blackish cloud, and the posterior margin is also blackish, as are the fringes. Secondaries, a rather lighter shade of orange, with a narrow regular marginal border, and the fringe black. Underside, entirely dull orange, with a narrow marginal border, and small discal spot on the primaries, black; palpi whitish, as is also the base of the tibiæ; thorax bluish, with some yellowish and brown hairs; abdomen, black at the base, the posterior half dull orange, concolorous with the posterior wings. Expanse of wings ♂ 0.40, ♀ 0.50, inch, 2 ♂ 3 ♀. Tuolumne Co., Cal. Jno. Muir, to whom I have great pleasure in dedicating this interesting species.

Type. Coll. Hy. Edwards.

ORIBATES LIMBATUS, n. sp.

Primaries with the basal space sordid white, with a few brownish patches on the costa; posterior portion, rich purplish brown, mottled with a paler shade; a dark brown, triangular patch on the costa near the apex; fringe two shades of brown; Secondaries, bright orange, with marginal line of black; fringes, brownish; thorax and abdomen above concolorous with the base of the forewings; beneath whitish, as are also the tarsi; the under side of the wings is orange, as in O. Muirii, with some small brownish patches on the costal edge of primaries, and the apex also broadly brownish. Size of O. Muirii.

4 ♂, 5 ♀ Mazatlan, Mexico.

Type. Coll. Hy. Edwards.

This insect when disturbed, alights among loose stones, something after the habit of Syneda, and it is then extremely difficult to discover. The specimens in my possession were taken on a rocky hill near the city of Mazatlan. It may yet be found within our borders.

ANNAPHILA AURANTIACA, n. sp.

A curious form, differing extremely in its coloration from the remainder of the group, and at first suggesting a new genus. I can however, find no characters by which it may be separated. The primaries are light brown, with darker brown markings; the reniform is clear creamy white; the basal lines are obliquely waved and broken, and the t. p. line is pale, deeply sinuate, and resting on a dark cloud; margin dotted with black; fringe brown. Secondaries, bright deep orange, with an oblong black discal spot, and a rather broad marginal band of black, slightly waved internally, and narrowing at the anal angle; base of the wing with long smoky hairs; fringe smoky brown. Underside, bright orange, with a broad smoky black border to both wings; very wide at the apex of the primaries, which have a blackish subbasal dark round spot near the apex of the cell, and a large oblong one at its posterior extremity; the secondaries have a sub-ovate discal spot; thorax, abdomen and legs, light fawn color, the scales having a slight golden reflection.

Exp. wings, 0.75 inch, 1 ♂ Geysers, Cal. R. H. Stretch.
Type. Coll. Hy. Edwards.

ANNAPHILA PUSTULATA, n. sp.

Allied to A. Domina. Hy. Edw., but differing by the lines of the primaries being white, and by the presence of a large square black velvety patch, behind the reniform, filling up the whole of the posterior portion of the cell. The reniform is whitish, and thus the insect has a more mottled appearance than is usual. Secondaries orange, as in A. Domina, but the discal spot is oblong and much larger than in the allied species, while the marginal band is here more sinuate, and narrows in the middle to a mere line, the band being broadest at the anal angle. Thorax and abdomen smoky black, the latter above thickly dotted with white scales. Underside pale orange, with the margins smoky black. In the centre of the primaries is a large cuneiform black patch, divided by the whitish reniform and by a white line near its posterior portion. The secondaries have, in addition to the blackish margin, a sublunate discal spot and some scales near the anal angle, black. Exp. wings, 0.80 inch, 1 ♀. Prescott, Arizona. W. Howard. Type, Coll. Hy. Edwards.

ANNAPHILA ARVALIS, Hy. Edwards.

This species described by me (Proc. Cal. Ac. Sc., 1875), from Dr. Behr's M. S. name, must be rechristened, as Arvalis is already occupied in the same group, viz., Axenus Arvalis, Grote. As the present form is usually found upon catkins of willow, I propose for it the name of *Annaphila Salicis.*

TARACHE SEDATA, n. sp.

Size of T. erastrioides. Primaries cream color along the cos-

tal half, interrupted in the middle of the wing by an oblique oblong brownish streak, by an almost square brownish patch above the reniform, and by a deep brown shade at the apex. The inner half of the wing is rich greenish brown, inclosing a small sub-triangular fawn-colored patch at the middle of the internal margin. The t. p. line is deep brown—very much sinuo-dentate, and running from the posterior third of internal margin to a point very close to the apex. It is surrounded by a brownish cloud, in which are some bluish scales. On the internal half of the posterior margin is a sublunate cream colored patch, and the margin has a series of black triangular dots between the nervules. Fringe white, brown at the apex. Secondaries smoky white, with a very faint reddish tinge. Underside dull smoky white, darker on the margins and at the apex of the primaries. Thorax white in front, brownish on the disc and behind. Abdomen concolorus with the lower wings.

1 ♂ Prescott, Ariz. W. Howard. 1 ♂ Tucson, Ariz. W. S. Edwards. Type. Coll. Hy. Edwards.

FRUVA ACERBA, n. sp.

Primaries dull smoky black, with a few scattered bluish scales. The costal half of the base, an almost square spot on costa near the apex, and a triangular one on the internal margin, sordid white. The two latter form an interrupted band. The t. p. line is velvety black, visible only on the internal margin. The submarginal line is composed of velvety black dots, edged posteriorly with a silvery reflection. Fringe smoky. Secondaries smoky brown, with white fringes. Underside wholly smoky brown, with satiny reflection. Thorax and abdomen concolorous with the wings, the former with a few bluish scales. Exp. wings, 0.75 inch.

1 ♂. 3 ♀. Sonoma Co., Cal.
Type, Coll. Hy. Edwards.

FRUVA ACCEPTA, n. sp.

♂. Primaries bright ochraceous, with a darker median shade reaching to the posterior margin, but not spreading to the apex. At the base is an oblique stripe of cinnamon brown, and a narrow line of the same color along the costa. Secondaries smoky brown, fringe ochraceous. Thorax ochraceous; abdomen concolorous with the secondaries. Underside dusky ochraceous, yellowish along the internal margin of the primaries and the secondaries of rather a lighter shade.

♀. Primaries with the base bright chestnut brown on the internal margin, pale ochreous on costa, the latter color also extending obliquely along the internal margin toward the internal angle. Apex pale ochreous. The rest of the wing blackish, thickly covered with ochreous scales. Secondaries brownish, as in the ♂.

Underside smoky brown, with the costa and inner margin of primaries pale ochreous.

3 ♂. 2 ♀. Tallahassee, Florida. Mr. A. Koebele.
Types. Coll. Hy. Edwards. Exp. wing, 0.70 inch.

LITOCALA SEXSIGNATA, Harvey.
n. var. *Deserta.* Hy. Edw.

A form occurring in Colorado and Arizona in which the primaries are much more profusely mottled with white, the median space and large reniform spot being almost clear white. The spots of the secondaries are also more yellow and considerably larger, the large discal one being more irregular in outline than is the case in the typical form.

SYNEDA SEPOSITA, n. sp.

♂. Size and aspect of S. Adumbrata, Behr. The primaries are blackish at their base, covered with whitish scales. The anterior line enclosing the middle space is deeply toothed near the second submedian nervule and is deep black. Median band moderate in width, nearly equal throughout its length, bright chestnut brown, shaded with a paler tint anteriorly. Behind this, almost touching the costa, is a sub-oblong white patch. This rests on a dark brown field, broad on the costa, extending up towards the apex, but greatly narrowed on the internal margin. On the costa are faint indications of small greyish blotches. The sinuo-dentate submarginal line is white, edged with dark brown, and the space between it and the margin is brownish, with grey scales, becoming paler at the internal angle. Marginal line scalloped, black, edged outwardly with grey. Fringe, brown. Secondaries, dull yellow, with a waved median band of black, deeply toothed in the middle, and joined to another band in the centre, which passes to the base of the wing. The margin has two sub-ovate black spots, joined by a black line, and the abdominal margin is also blackish. Fringe, yellow, mottled with black. Underside, yellow, the primaries with blackish margin, with a submarginal band of black, joined to a median one of the same color, meeting before reaching the internal margin. Secondaries, similar to the upper side.

Exp. wings ♂ 1.35 inch. ♀. 1.45 inch.
S. Colorado. Type. Coll. B. Neumoegen.

SYNEDA HASTINGSII, Hy. Edw.
N. var. *Perpallida.* Hy. Edw.

A peculiar form of the above species, in which the primaries have the margins much browner, and the secondaries yellow instead of crimson. The markings are otherwise identical. It cannot be confounded with either S. Divergens Behr. or S. Adumbrata Behr., as the submarginal band is nearly straight inwardly,

and very widely separated as in S. Hastingsii from the oblong discal spot.

1 . Summit Station, Sier. Nev. California.

Type. Coll. Hy. Edwards.

SYNEDA ADUMBRATA. Behr.

n. var. *Saxea. Hy. Edw.*

Much smaller than the typical form, and differing also in having the primaries of a reddish tint, and the submarginal pale band proportionately narrower. The discal patch of secondaries, too, is nearly always separate from the waved submarginal band, and not connected with it as in the allied form, while the underside is of a richer orange, with the markings heavier and more distinct.

Exp. wings, 1.45 inch. *S. Adumbrata*, 1.75 inch.

Colorado, H. K. Morrison. Higher Sier. Nev., Hy. Edwards.

Type. Coll. Hy. Edwards. 3♂. 4♀.

MELIPOTIS TENELLA. n. sp.

♂. Primaries with the basal space grayish fawn color, darkest on the costa, and terminated by a broad black line running obliquely to the middle of the inner margin, straight anteriorly, and slightly sinuate behind. A wide fawn colored median space, twice as broad on the costa as on the internal margin. Behind this, resting on the costa, is a large whitish patch, shading into fawn color, and surrounded outwardly by a deep brown shade. This white patch has a deep tooth about the middle, and encloses a dark-brown linear mark at its junction with the fawn-colored median band. Posterior margin of the wing light grey, dotted with brown scales. Fringe, greyish brown, except the apex, which is white. Secondaries pure white, with a marginal band of black, passing into a narrow waved line on the anal angle, and with a very faint black discal dot. Fringe, broad, white. Underside clear white, with slightly opalescent tint. Primaries with an imperfect submarginal blackish band, and a central one, oblique, joining the submarginal before it reaches the inner margin. Secondaries, with very faint trace of the marginal band, but with a large subovate black spot near the anal angle. Thorax fawn color. Abdomen brownish gray, as are also the tibiæ and tarsi.

♂. Similar to the ♀., but the secondaries are dusky, with the marginal band a little wider.

Exp. wings, 1.40 inch.

N, W., Texas. J. Boll.

Types. Coll. B. Neumoegen.

SYNEDOIDA SABULOSA, n. sp.

Primaries, dusky brown. Basal space, blackish with drab-colored scales. Median band, stone drab, broad on the internal margin, turning suddenly forward on reaching the median nervule

and narrowing greatly on the costa. The space behind the median band is the same color as the base, and encloses the usual sub-costal spot, which is here whitish, edged with brown, and with a small tooth anteriorly below the middle, irregular on its posterior edge. Submarginal space, greyish. Margin, blackish, scalloped, with the fringes stone drab, pointed with brown at the extremity of the nervures.

Secondaries, sordid white at the base, broadly shading into dusky on the margins. Sublunate discal spot, very distinct. Underside, sordid white, with the margins and a central shade joined to submarginal band, dusky.

Exp. wings, 1.40 inch.

4 examples, ♀ ♂ Southern Colorado.

Types, Coll. B. Neumoegen.

SYNEDOIDA INEPTA, n. sp.

Ground color of primaries, reddish fawn color, as also is the thorax. The lines are distinct, and are blackish in most examples, though sometimes they are almost lost in the ground color of the wing. The ant. line is very broad, oblique, only slightly toothed. The basal space is a little paler than the median band, which is a reddish fawn color, nearly equal in its width throughout, and terminated posteriorly by a faint black line. On this, near the costa, rests a small and almost obsolete white blotch, toothed posteriorly, and surrounded by a blackish shade. The sub-median space is greyish, with some dusky lines indicating the course of the nervures. Sub-marginal space, bright fawn color, the termination of the nervures marked by black lunules. Fringe, concolorous. Secondaries, sordid white at the base, the margins, as are also the nervures and the lunate discal spot, smoky black. Fringe, reddish white. Underside, wholly sordid white, with a broad blackish shade crossing the primaries near the middle, and a faint linear shade near the apex. Fringes concolorous. Exp. wing, 1.40 inch.

5 examples, ♂ ♀ Southern Colorado.

Types coll. B. Neumoegen.

SYNEDOIDA MORBOSA, n. sp.

In this species, which is closely allied to the last, the general color is pale ochreous, with all tne lines, though strong, somewhat confused in their outline. The basal space is larger than in S. Inepta, and the reniform is well marked, almost black, and surrounded by a dusky cloud. In S. Inepta, the reniform is obsolete. Along the costa are four blackish triangular patches, the apical largest. At the base of the costa are four indistinct black dots. The t. a. line is oblique, toothed outwardly, and there is no line visible on the median space between it and the submarginal line which is broad, slightly dusky, sinuous, with two large teeth direct-

ed outwardly. On the margin, between the nervures, are brownish lunules. Fringe concolorous. Secondaries, sordid white, margin broadly dusky, as is also the lunate discal spot. Beneath, entirely sordid white, with dusky shade in centre of the primaries, and the margins sometimes dusky. Thorax ochreous, with pinkish scales. Abdomen, sordid white, with blackish scales. Exp. wings, 1.50 inch. Several examples. ♂. ♀. Colorado, Utah, Arizona, Florida. Types Coll. B. Neumoegen, Hy. Edwards.

It is possible that this and S. Inepta, may prove to be extreme forms of the same species.

HOMOPTERA RUBI, n. sp.

♂. General color, stone drab, lighter, and less brown than any other species known to me. Primaries with the t. a. line broad, oblique, approaching very closely to the base of the wing, rich brown, narrowly bordered with a darker shade. Median space sparingly dotted with blackish atoms. Reniform, sublunate, edged with dark brown. The t. p. line is very strongly marked, showing in vivid contrast with the pale color of the wings. It is rich brown, edged with a darker shade, with a deep tooth in the middle, joined to another brownish shade, which reaches the margin of the wing. Secondaries with a rather broad and distinct submedian band, brown, edged as in the superior wings, with darker shade, and several waved bands of dark drab both at the outer margin and towards the base. Thorax and abdomen concolorous, with the collar and thoracic tufts flecked with brown. Underside wholly of the color of the upper, with faint median double line on both wings, and a discal spot on secondaries, brown. The margins are also brown, and the whole of the wings thickly dotted with blackish atoms.

♀. Resembling the ♂, but with the brown bands of the upper surface almost obsolete, the insect being thus almost of uniform color. Exp. wings, 1.55-inch.

3 examples. Sacramento, Cal.; Havilah, Cal.

Typ. Coll. Hy. Edwards.

This species is most nearly allied to H. Atrilineata. Harvey, but differs from it by its large size, paler color, greater angularity of the t. p. line, and by the generally heavier markings.

A NEW SPECIES OF ARCTIA, FROM COLORADO.

By B. NEUMOEGEN.

ARCTIA DETERMINATA, n. sp.

Head and palpi creamy white; orbits of the eyes black; a black spot on the vertex, between the autennæ, which are moderate, bi-serrate, of blackish color, but whitish at tips of pectinations. Thorax equally creamy white, with two prothoracic and

three large thoracic black maculations. Palpi hairy, abdomen creamy white with a slight tinge of pale rose color at base; above with a broad black dorsal line, and two black lateral lines segmentarily serrated; beneath two lateral lines of black, segmentary maculations. Legs black with whitish lines above, the posterior tibiae being distinctly marked by a whitish upper surface.

Primaries brownish black; inner margin narrowly edged with a creamish white line. Fringes of blackish color, irregularly intermixed with creamish white tinges; markings of creamish white, as follows; a moderately broad line, between median and internal nervules, starting from base of wing and running horizontally, nearly touching the outer margin. Two transverse lines, divergent on the costa, but nearing each other, nearly uniting, and resting on the horizontal streak. Outside of this the usual zigzag line, running from costa, where it is in conjunction with the anterior transverse line, and resting on the horizontal line, the inner space formed by this angulated line resembling two black triangular fields, the lower one being the largest of the two. The first angle of this line is somewhat distant from anterior margin, but its second rests on the latten.

Secondaries of pale rose color, fading into yellowish towards base, with fringes blackish, irregularly intermixed with creamish white; a black marginal band, rather narrow along costa, but especially broad from apex to inner angle, the inner line being sinuate. A black streak on submedian vein, extending from base and nearly connecting with marginal band. A black discal line running parallel to the streak on submedian vein and likewise nearly connecting with marginal band; a small black costal spot.

Beneath the markings are the same, only that the light rose color of upper surface of secondaries is substituted by creamish white.

Expanse of wings, 1⅜ inches.

Length of body, ⅜ inch.

For some unknown reason this insect has been erroneously determined as A. Cervinoides, Streck, in some collections. Mr. F. Tepper has kindly lent me his specimen of A. Cervinoides for examination, and I feel prompted to state that the same is an entirely different insect from A. Determinata.

Habitat: Middle and Southern Colorado.

Collected by H. K. Morrison, season 1877; by J. Doll and B. Neumoegen, season 1880.

Types, Coll. B. Neumoegen.

New York, February 8, 1881.

DESCRIPTION OF THE LARVA OF TERAS PERMUTANA.

By D. W. Coquillett.

I am indebted to Professor Fernald for the determination of the following species, which is found both in Europe and the United States.

Teras Permutana, Dup.

Body green, the sutures yellowish when the caterpillar is in motion; a dark-colored dorsal line; an indistinct light-colored stigmatal line; head and venter pale green; length, 7/8 inch. Feeds on willow, living between two or three leaves, which are fastened together with silken threads. Two spun their cocoons about June 13, producing the imagoes June 27. Others were taken July 2, but died before pupating.

CAPTURE OF DIADEMA BOLINA, LINN, IN FLORIDA.

This species is figured in Drury, vol. 1, plate 14, and in Westwood's edition is called Nymphalis *Bolina*, described thus: "Wings dark chocolate color, almost black, but when held against the light in a certain direction display a bluish purple; anterior wings in the middle have a large white oval spot, and another smaller oblong white spot at the tips; posterior wings with a white spot larger than in the superior ones; on the edges of all these spots the purple color beiore mentioned is very conspicuous."

A fine ♂ of this species was taken at Indian River, Florida, Nov. 11th, 1880, and I have recently received it. It is size of ♂ L. *Disippus*, and in shape resembles a Limenitis. My correspondent writes that he had seen, at different times, two others on the wing, but unfortunately had no means at hand of capturing them.

Drury gives the habital as "Bombay, Surinam, all the W. I. Islands, New York, Carolina, Brazil, Cape of Good Hope, Malabar, Ceylon, China," and I find that Kirby, Cat., says, "Regio Indica, Africa, Australia, Guiana." In Doubleday's Gen., *Bolina* is attributed to America, Africa and Asia. The species is in none of the N. American lists, and so far as I am aware has not been taken in the U. S. in the present generation.

During the past year several examples of Pieni *Ilaiare*, Callidryas *Agarithe*, and Lycænas *Cassius* and *Ammon* have been received from Indian River,

W. H. Edwards.

Coalburgh, W. Va., Jan'y 20, 1881.

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BIOGRAPHICAL SKETCH OF M. ACHILLE GUENEE.

By A. R. Grote.

Monsieur Achille Guenee died at Chateaudûn on the 30th day of December, 1880, in the 72d year of his age, and the world has lost an excellent Entomologist.

I remember well the little old town, perched on a hill near the left bank of the Loire, and overlooking the valley through which that river makes its way. Its castle and churches, the square in front of the inn filled on market days early in the morning with sellers of country produce of all kinds; its paved streets without trees, and for the most part without sidewalks; a ruined archway, with an inscription, incomplete and defaced, of "Liberté, Egalité," and the rest (a curious commentary on the appearance of the horrible old women who picked up the droppings on the streets for a living)—all this and much more I noticed between my arrival in Chateaudûn one evening and my call on M. Guenée the next day, as by appointment. For M. Guenée then, it being summer, lived out of town, but was to come in and open his house for my reception.

The collaborator of Dr. Boisduval, in the "Species Générales des Lepidoptéres," was a thin, rather short, dark, beardless man, polite and pleasant as most as most of his nation are, but with a good heart behind his somewhat diplomatic manners. The house was old, dark and gloomy, and probably appeared at an additional disadvantage from having been closed for the summer.

Before proceeding to examine his collection of types of American moths, which was the main object of my visit, we sat down to a déjeuner a la fourchette, consisting chiefly of a bottle of good wine and an ancient game pasty, in which latter I half suspected I should find some entomological acquaintances had taken up their dwelling.

M. Guenée's collection was contained in glass boxes, many of the type specimens being separately put up. The rest of the

day was spent in looking this over and comparing my own specimens with M. Guenée's types. Unfortunately, the collection which I had brought with me was comparatively small, and M. Guenée no longer possessed types of a great number of moths, American species, which he had described. I, however, verified or corrected a number of my previous determinations of his species, and was able to make several new ones, which I have since disseminated among entomologists in this country.

With the evening we parted, promising each other a future meeting, which was destined never to take place. This was in 1867. Our correspondence since that time had been slight, but only recently M. Guenée had sent me an outline drawing of some of his species of Noctuidae, which enabled me to recognize his *Mamestra Passer* and his *Celaena Exesa*.

So far as American Lepidopterists are concerned, their interest in M. Guenée begins and ends with his six volumes in the series of the "Species Générales." There is no necessity at this time to enter into any detailed criticism of this work. Its publication and the friendship of Doubleday gave to its author a popularity in England, which he can hardly be said to have outlived. In Germany, M. Guenée's classification of the moths met with decided and growing opposition among the best entomologists. For myself, being a student of his work, especially the volumes on the Noctuidæ, I believe him to have been an excellent describer of species, but a deficient observer of generic characters. The material out of which M. Guenée composed his genera *Agrotis*, *Noctua*, *Hadena*, *Mamestra* and *Aplecta*, is badly selected, and species are consorted without regard to natural characters which had been already discovered by Stephens and earlier writers. On the other hand, the effort of M. Guenée to gather structural features from *all* the stages of the insect, merits favorable notice. The North American species of Noctuidæ which he has described, I have been able largely to make out from his published descriptions. A few species of *Acronycta*, *Leucania*, *Hadena*, etc. remain unknown to me. Among single forms which should be sufficiently striking are *Lepidomys Irrenosa*, *Mythimna Culea*, and *Cleoceris Onychina*, that I have not been able to recognize as yet in any of our collections. M. Guenée also drew up descriptions of several species from drawings by Abbot, and none of these have been satisfactorily identified and probably cannot be.

Notwithstanding the criticism of Clemens, published in the Proceedings of the Academy of Natural Sciences of Philadelphia for 1860, and which, while it may be considered in the main correct, is particular and unnecessarily personal, M. Guenée's work retains a literary and scientific value, which atones for its now apparent defects. It is, however, somewhat curious to find Dr. Clemens taking Guenée to task for overlooking the ocelli in *Dory-*

odes, and at the same time advancing the statement that these organs are always absent in the *Phalenites*, which is not the case. In fact the absence or presence of ocelli cannot be considered of family value in the Lepidoptera. And when we compare Dr. Clemens's writings on the Phycidae, we can see how easy it is to neglect to observe structural characters in the moths.

M. Guenée will always survive in the memory of American Entomologists so long as they find *Catocala Parta* on the willows, or, at dusk, take *Plusia Thyatiroides* hovering over flowers. The impartial historiographer will, I think, always recognize the fact that the works of M. Guenée have done much to encourage the general taste for Entomology, as well as to advance our knowledge of their special subject, and this must be sufficient to keep his name and fame bright among us. Dr. Packard, in naming the genus *Gueneria*, says that American lepidopterists are under lasting obligations to M. Guenée, in which statement I heartily concur.

NEW NOCTUIDS, WITH A LIST OF THE SPECIES OF ONCOCNEMIS.

By A. R. Grote.

Oncocnemis Major n. sp.

Eyes naked; fore tibiæ with a claw; middle and hind tibiæ unarmed; abdomen untufted. Dark gray, closely resembling *Chandleri*, but larger, without the basal black dash, more uniformly dusky gray. Median lines indicated on costa, else lost. Median shade vague, broad, diffuse. Veins incompletely marked with dusky. A terminal series of black interspaceal dashes, neatly and evenly interrupted by the subterminal line, which is else obsolete. The hind legs are blackish fuscous, pale at base, with white interlined fringes. Two specimens, Colorado, Mr. Neumoegen.

Oncocnemis Aqualis n. sp.

♀. Eyes naked; fore tibiæ with a claw. Related to *Chandleri*, but stouter. Forewings bluish-white gray over blackish. All the lines obliterate. Subterminal line wanting. The gray concolorous stigmata with difficulty perceived; all three present. Veins obsoletely marked. A distinct series of black interspaceal terminal lines or streaks. Hind wings smoky, the veins soiled, slightly iridescent, fringes whitish, interlined. Collar light gray, dusky behind, narrowly lined in front; head blackish. Beneath paler, discal spots present; hind wings whitish, irrorate, with a dotted exterior line feebly marked. *Expanse* 38 mm. *Hab.* California.

This Californian form differs by the black interspaceal dashes

not being interrupted by a transverse pale shade, which only shows in *Chandleri* where it cuts the dashes, but in var. (?) *Riparia* broadens into a whitish diffuse subterminal line.

The following is a new list of our species of *Oncocnemis*:

Genus ONCOCNEMIS Led.

Hind wings yellow.

1. *Hayesi* Grote, Bull. B. S. N. S. 1, 105, pl. 3, fig. 13. Colorado.
2. *Dayi* Grote, Bull. B. S. N. S. 1, 105, pl. 3, fig. 8. Colorado.
3. *Mirificalis* Grote, Bull. U. S. Geol. Surv. 5, 207. Nevada.

Hind wings soiled whitish or fuscous.

4. *Levis* Grote, Can. Ent. 121, 254. Colorado.
5. *Augustus* Harvey, Bull. B. S. N. S. 3, 73, pl. 3, fig. 5. Texas.
6. *Behrensi* Grote, Bull. B. S. N. S. 2, 65. California, in February.
7. *Glennyi* Grote, Bull. B. S. N. S. 1, 141, pl. 4, fig. 17. Colorado, in July.
8. *Cibalis* Grote, Can. Ent. 12, 244. Colorado.
9. *Homogena* Grote, Bull. U. S. Geol. Surv. 3, 800. Colorado, Nevada.
10. *Oblita* Grote, Bull. U. S. Geol. Surv. 3, 117. Nevada.
11. *Meadiana* Morrison, Proc. A. N. S. Phil. 1875, 60. Colorado.
12. *Chandleri* Grote, Bull. B. S. N. S. 1 107, pl. 3, fig. 9; id. 3, 87; Bull. U. S. Geol. Surv. 3, 117. Colorado.
    var. *Riparia* Morr., Can. Ent. 7, 213. Long Island; Buffalo, N. Y.
13. *Major* n. sp. Colorado.
14. *Aqualis* n. sp. California.
15. *Atricollaris* Harvey, Bull. B. S. N. S. 2, 273; id. 3, 73. Texas, Arizona.
16. *Saundersiana* Grote, Can. Ent. 8, 29. Canada; Illinois.
17. *Occata* Grote, Trans. Am. Ent. Soc. 5, 114; Bull. B. S. N. S. 3, 77, 87, pl. 2, fig. 6. Texas, California.

Hind wings black.

18. *Aterrima* Grote, Can. Ent. 11, 199. California.

HADENA CYMOSA n. sp.

Allied to *Arctica* and *Castanea*; darker than either, blackish brown; the thoracic tufts rufous; abdomen fuscous with dark dorsal tufts. Eyes naked. Forewings blackish brown, with the lines much as in *Arctica*, black; a black submedian dash. Stigmata large, black-ringed; orbicular, spherical, concolorous; reniform shaded with white and broken into white spots outwardly. Secondaries fuscous with darker exterior shading; beneath with discal spot. *Expanse* 45 mm. Washington Territory. Two specimens in my collection; others in collections of Messrs. Edwards, Tepper and Graef.

DEVA PALLIGERA n. sp.

Fore wings pale roseate or purplish, shaded with dark metallic yellow over median space below the median vein, at internal angle and on terminal space opposite the cell. Lines even, narrow, the outer line angulate below costa. Stigmata small, concolorous; orbicular rounded; reniform narrow, upright; a small round spot on median space just below vein 2 at its origin. Hind wings whitish, with a mesial line. Abdomen pale; thorax like fore-wings. *Expanse* 30 mm. Sierra Nevada. Hy. Edwards, two specimens.

This form differs from our Eastern *Deva Purpurigera* of Walker by the broader wings, paler color and distinctly annulate spots on the median space; the primaries have no dark irrorations, and are notably wider exteriorly. I retain the genus *Deva* as distinct from *Plusia*, on account of the thickly-scaled third article of the long and curved labial palpi. The genus is intermediate between Calpe and Plusia, and is one of several in our Fauna which take that position.

NOTES ON THE PACIFIC COAST SPECIES OF HEPIALUS WITH DESCRIPTIONS OF NEW FORMS.

BY HENRY EDWARDS.

The so-called species of Hepialus, inhabiting the Pacific Coast, are subject to the extreme tendency to variation, which appears, in most of the species of Lepidoptera, to prevail in that region, constancy in the general characters being the exception and not the rule, both in Rhopalocera and Heterocera, and the many forms of Argynnis, Colias Melitæa and Lycæna among the Diurnals, and of Alypia, Arctia, the present forms and many among the Noctuids seem to direct us to the earlier stages as the only means of clearly understanding their relative value as species. From a pretty close study of very numerous examples of Californian Hepiali, I am led to the conclusion that ultimately many forms will have to be included in one species, and that it is possible that H. Behrensii *Stretch*, H. Tacomæ, *Hy. Edw.*, H. Sceqquoilus *Behrens*, H. Montanus, *Stretch*; as well as H. Anceps *Hy. Edw.* and H. Rectus *Hy. Edw.*, will prove to be variations of one type. Subsequent investigation, alone, however, can assure us of this, and I, therefore, for the present, prefer to call attention to the differences which present themselves to me. For a rather large series of these interesting insects I am indebted to Mr. Oscar Baron of Mendocino, Cal.

HEPIALUS RECTUS. *Hy. Edw.* n. sp. (?)

Size of and closely approaching Hepialus (Stenopis Pack.) Montanus *Stretch*, but differing from that species by the position

of the maculate bands of the primaries. In H. Montanus, the median band starts independently from the costa, but joins the second submarginal band before it reaches the internal margin. In the present species, the oblique maculate bands, which are 4 in number, are independent and parallel throughout their whole course. The insect has a brighter and more distinctly brown color also, though this can hardly be regarded as a character of value.

Contra Costa Co., Cal.

Types, ♀ ♂ Coll. Hy. Edwards.

HEPIALUS ANCEPS. *Hy. Edw.* n. sp. (?)

Also closely allied to H. montanus, but of a much redder color, and with 3 bands instead of 4 as in H. Montanus, and H. Rectus. These 3 bands are distinct and independent of each other. The costal margins of both wings are very distinctly reddish brown, as are also the fringes, while in the former species, they are concolorous with the wings.

4 ♀ 2 ♂. Mendocino, Co., Cal.

Types. Coll. Hy. Edwards.

HEPIALUS INUTILIS. *Hy. Edw.* n. sp.

A small and obscure species, the size of of H. Modestus, *Hy. Edw.* and H. Lenzii *Behrens.* It is dark stone color over the whole upper and lower surface. On the primaries above are some scattered white scales, forming an indistinct oblique double band, and beneath are also a few irregularly distributed whitish scales. It thus differs considerably from H. Modestus, in which the wings are concolorous throughout, without any trace of markings.

1 ♀ 1 ♂ Summit, Sier. Nev. Cal.

Types. Coll. Hy. Edwards.

NOTES ON FITCH'S SPECIES OF TORTRICIDS.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, ME.

The late Dr. Asa Fitch has described several species of the *Tortricidae*, some of which entomologists have failed to recognize. In his Second Report (Trans. N. Y. State Ag. Soc. 1855, p. 473), he described *Brachytaenia Malana*, which has since been referred to the genus *Nolaphana* among the Noctuids. Immediately following this, on page 476, he described another species under the name of *Brachytaenia Triquetrana*, which he said was closely related to *Malana*. If he was correct, of course it does not belong to the *Tortricidæ;* but the description, though short, is quite suggestive of some species of *Teras*.

In his Third Report (Trans. N. Y. State Ag. Soc., 1856, p. 357), Dr. Fitch gave us his description of *Crœsia Persicana*, and

what this insect might be has been a mystery until recently, when Prof. J. A. Lintner discovered the type among the insects in the collection at Albany, and had the great kindness to send it to me for examination. The original description of this insect is very faulty and misleading, for it gives black as one of the colors on the fore-wings, where it should give brown. This same species was taken by Dr. Packard, in Brunswick, Me., and sent to Dr. Clemens, who described it under the name of *Ditula ? Blandana* (Proc. Ent. Soc., Phil., vol. 3, 1864, p. 515); and in 1869 Dr. Packard himself described it in his Guide, page 335, where he names it *Lozotænia Fragariana ;* and in 1875 Prof. Zeller described it in his Beiträge under the name of *Tortrix* (*Argyrotoxa*) *Conigerana.* By some oversight, Prof. Zeller placed it in the subgenus *Argyrotoxa*, when it should have been put in *Ptycholoma* Steph. As the description of Fitch antedates the others, the insect should be called *Ptycholoma Persicana* (Fitch).

In the same report, page 382, Dr. Fitch described his *Lozotaenia Cerasivorana*, which is well known, but should be referred to the genus *Cacoecia* Hüb.

On page 459 of the same report, *Ephippophora Caryana* is described by Fitch; but Dr. Shimer, not recognizing this, redescribed the same species by the name of *Grapholitha Caryae* (Trans. Am. Ent. Soc., vol. 2, p. 394, 1869).

In 1858, Dr. Fitch, in his Fifth Report, described his *Argyrolepia Quercifoliana* (Trans. N. Y. State Ag. Soc., p. 826, and I am indebted to Prof. Lintner for an opportunity of examining the type of this species. Prof. Zeller redescribed the same thing in his Beiträge, in 1875, by the name of *Tortrix* (*Argyrotoxa*) *Trifurculana.* The species should be called *Tortrix Quercifoliana* Fitch.

I am not aware that Dr. Fitch described any other species of the *Tortricidae*, and these are now all known save *Brachytaenia Triquetrana*, if indeed this is a Tortricid.

In the Second Report of Dr. Cyrus Thomas, Entomologist to the State of Illinois, page 114, Miss Emma Smith gave the natural history of what she called *Argyrolepia Quercifoliana* Fitch, including, with notes of her own, the description of Fitch; and in a foot note by Dr. Thomas it is stated that "Prof. Fernald has identified this as Zeller's *Tortrix Trifurculana.*" After seeing the above report with this statement, I tried to obtain examples of Miss Smith's insect to see what it really was, and finally succeeded in obtaining it through Prof. Lintner, but it proved to be *Tortrix Flaccidana* Rob., a very different insect from *Quercifoliana* Fitch. I am in no way responsible for the identification of Miss Smith's insect, for I never saw an example of it till long after the report was published.

DESCRIPTIONS OF NEW SPECIES AND VARIETIES OF ARCTIIDÆ.

By Henry Edwards.

Euprepia Opulenta. *Hy. Edw.* n. sp.

Primaries sordid white. At the extremity of the cell, two minute brownish dots, and beyond them a broken irregular brown patch, and another at the extremity of the median nervule, broken up into small irregular patches on the posterior margin. Apex of the wings brownish. On the internal margin near its posterior termination, are two brown triangular spots and a small brown dot about the middle of the interior margin, resting above the submedian nervure. Secondaries, scarlet with an orange tint. On the costa, near the apex, is a small golden yellow blotch, a circular spot of the same color in centre of the wing, and another near the anal angle. There is also a small golden yellow mark at the extremity of the cell. There are two submarginal black spots. surrounded by a ring of golden yellow, the one nearest to the costa being oblong, and the other circular. Beneath, both wings are washed with scarlet, the primaries having 2 submarginal black spots, and a median band of golden yellow. Apex sordid white. Secondaries with a yellowish band on the costa near the base, and the markings of the upper side, faintly repeated. Thorax above, brownish black, except its front, which is scarlet. Patagia, whitish. Abdomen scarlet above and below, imperfectly banded with black. Legs and under side of thorax, dusky brown.

Exp. of wings, 2.00 inch.

1 ♂ Yukon River, Alaska, 700 miles from the mouth. F. A. Smith.

Type. Coll. Hy. Edwards.

A most remarkable and unique form. If a variation of any species, I know not where to refer it, as it appears in some respects to differ structurally from A. Caja. L. I know of no other species of which it can possibly be a variety. It is extremely interesting, not only for its beauty and its curious appearance, but also from the locality of its capture.

Arctia Incorrupta. *Hy. Edw.* n. sp.

Closely allied to A. Blakei, *Grote*, but differing from that species by the presence of a distinct sub-basal band, broadest on the costa, and running quite across the wings to the internal margin of the primiaries. The costa of the secondaries is rosy, and the black marginal spots are clearly cut, 4 in number and not confluent on the costal apex. There are no discal spots as in A. Blakei, but the wing is rosy to the base. I have seen 6 or 7 examples of A. Blakei, and have found the costa of secondaries in all of them rather broadly black, and the discal spots, 3 in num-

ber, as in M. Stretch's figure. (Zygænidæ and Bombyc, N. A. Page 224. Plate 9.)

3 ♀ Prescott, Arizona, 1 ♂. Dalles, Oregon.

Type. Coll. Hy. Edwards.

ARCTIA ACHAIA, *Bdv.*, *VAR. BARDA.* *Hy. Edw.*

A dark form of A. Achaia. in which the sub-basal transverse line of primaries is wanting, and the rest of the lines are much narrower than in the usual form. The secondaries are quite black at the base, along the costa, and very broadly so upon the posterior margin—the red markings being reduced to a moderately broad and deeply dentate band, touching the anal margin, and surmounted by a small ovate discal spot. In a second specimen, the red band encloses a small black spot.

2 ♂. North. Calif. Dalles, Oregon.

Type. Coll. Hy. Edwards.

ANTARCTIA PUNCTATA, *VAR. PROBA.* *Hy. Edw.*

Under this name I call attention to a form of the above species, which differs from the type by having the secondaries always concolorous with the primaries in both sexes, and by the maculate band being more broken up into spots. It is the mountain form of this insect, all the specimens I have examined having come from the higher Sierra Nevada, where it appears to be perfectly constant in color and marking.

3 ♂ 2 ♀. Truckee, Summit Station and Bear Valley. Sier. Nev., Cal.

Types. Coll. Hy. Edwards.

HALESIDOTA INGENS. *Hy. Edw.*, n. sp.

Allied to H. Sobrina, *Stretch*, but differing by its extreme size and some changes in the form and number of the spots. Head at base, front and sides of thorax, yellowish white; middle of thorax and front of the head rich brown, as also on the palpi, chest, and base of tibiæ. Abdomen above, pale buff with brownish band at the sides, and dull white beneath. Primaries rich brown, with four rows of white spots, the basal one very irregular in shape, and composed of three spots, the sub-basal one of four spots, and the median submarginal rows are oblique, and are composed of six and seven spots respectively. Between the median and sub-basal row is a large sub-oblong spot on the costa, and the margins have a row of small triangular spots at the termination of the nervules. Secondaries sordid white, yellowish at the base, with a small discal spot, and a row of confluent marginal spots, from the apex to the median nervule, black. Beneath, the markings of the upper side are faintly repeated.

Exp. wings., 2.50 inch.

1 ♀. Prescott, Arizona.

Type. Coll. Hy. Edwards.

The largest species of the genus known to me.

A CHOREUTES ON SILPHIUM INTEGRIFOLIUM.

By A. R. Grote.

Mr. Coquillett has communicated to me specimens of a *Choreutes* which he has reared, together with a description of the larva. The species appears to be new and is considered by Professor Fernald to be distinct from *Pretiosana*.

Choreutes Silphiella, n. s.

Thorax orange, with a metallic stripe on the tegulae. Head olivaceous. Pectus and basal joint of palpi whitish. Fore wings with the base orange, to a dusky, inwardly oblique, transverse shade line. A longitudinal metallic stripe before the shade line below costa and some metallic scales below median vein. Middle of the wing mottled, grayish, enclosing two metallic discal spots edged with black, superposed; below them two faint blackish lines to internal margin. Apical portion of the wing taken up with a wide circle of dusky and orange scales enclosing a series of metallic points edged with black. The space enclosed by the circle, near the margin, is gray and mottled like the middle of the wing. The metallic spots have a violet or green reflection. The circle is twice cut by oblique orange stripes, over the sub-costal nervules and over the median nervules, in opposing positions. Edge of the wing dusky, fringes dark. Costal edge with two white dots beneath, wide apart. Hind wing blackish; beneath crossed by a white sub-terminal band, and another before the middle of the wing. Length of forewing 5 to 6 mm. *Hab.* Illinois.

The larva of this species is described by Mr. Coquillett as follows:

Choreutes Silphiella, *Grote.*—Body thickest at the middle, tapering toward each end, pale green; a dark colored dorsal line; piliferous spots and cervical shield green; head small, nearly horizontal, pale green, with a black dot on each side near the jaws, and usually with a black dash on each side near the junction of the head with the first segment; venter pale green, unmarked; 16 legs; length, 13 mm. Lives in communities on *Silphium Integrifolium* in nests formed by fastening the terminal leaves together with silken threads. Found June 19; imagoes July 2.

A distinct but allied species of *Choreutes* has been collected Mr. Hy. Edwards in California (*Sierra Nevada*).

DESCRIPTIONS OF GEOMETRIDÆ, CHIEFLY COLLECTED BY MR. PILATE.

By A. R. Grote.

Plagodis Floscularia, n. sp.

♀. Larger than the other species, and of a different color. Fore-wings vivid lemon yellow, with the costa, at base, touched

with pinkish brown, and the costal edge, between the two transverse shaded lines, washed with very pale pinkish. The two lines merely indicated. Basal line a little darker yellow than the ground color, and apparently including double narrow lines, arcuate. Outer line commencing near apices, where it is touched with red; below this obsolete and appearing again as a dark brown line, edging inwardly a large pinkish brown patch on internal margin before the angle. Apices with a red fleck. Hind-wings pale yellow, fading to whitish to costa and base. At internal angle is a patch, margined by darker lines, corresponding to the patch before internal angle of primaries. Body lemon yellow, anus shaded with reddish. Breast and head pinkish. Venter shaded with reddish. Wings beneath lemon yellow; the pinkish patch at anal angle of secondaries distinct and somewhat diffusely extended. There are no irrorations on the wings of this lovely insect, which expands an inch and a half. Ohio. Mr. G. R. Pilate.

ASPILATES GAUSAPARIA, n. sp.

♂. Smaller than *Lintneraria*. Antennæ bipectinate. Upper surface of wings and body entirely concolorous, dusky purplish red. Primaries crossed by three faint black lines formed by aggregations of the black scales with which the wings are besprinkled. A sub-basal arcuate line; a waved median shade line; both of these a little diffuse. A narrower, uneven line at apical fourth, continued to internal margin. A black discal dot just beyond the median shade, surrounded by a brighter tinting on the cell. Hind-wings with dot, and the outer line continuous. Beneath much paler, with dots, and an outer common line. *Expanse*, 26 mm. Wisconsin.

DEILINIA GLOMERARIA, n. sp.

♀. White; wings sprinkled with blackish. Front, between the eyes, reddish. Wings entire; hind-wings rounded. Small black discal dots on both wings. A single regular denticulate blackish extra-discal common line crosses both wings. The dark powderings are more massed on terminal space of fore-wings, before the fine, incomplete terminal line. Beneath more whitish, with the dots distinct and the line indicated. In its course this line is a little bent on primaries above, running in over the median nervules. *Expanse* 26 mm. Ohio, Mr. J. R. Pilate; Canada.

In this species and the following the tibiæ are not incrassated. I do not know the males, which prevents my feeling sure that they belong to this genus.

DEILINIA SEPTEMFLUARIA, n. sp.

♀. White, with brownish irrorations. Front a little reddish. Hind-wings slightly produced at the middle. Ornamentation distinct. Fore-wings crossed by three even ochre lines; the first,

arcuate, beyond the base; the second nearly straight before the middle of the wing; the third at three-quarters from base, a little bent opposite the cell, else nearly straight. Just beyond this line is a faint dark line, not easily perceived, containing a distinct dark scale blotch between veins 3 and 4. This and the outer two ochre lines are continued across hind-wings, which also have the scale blotch in the same place. Beneath the markings repeated; discal marks; the irrorations are coarser and yellowish in part. *Expanse* 23 mm. Ohio, Mr. G. R. Pilate.

PAPILIO ECCLIPSIS, A DOUBTFUL OR LOST N. AMERICAN BUTTERFLY.

By Dr. Herman H. Hagen.

I desire to draw attention to the famous Papilio Ecclipsis *Linn.* The specimen is figured by Petiver in Gazophylaz. Pl. 10, fig. 6; the quotation by Kirby, pl. 33. f. 11, is erroneous, and refers to Erebia Portlandia. Petiver, p. 16, says "It exactly resembles our English Brimstone Butterfly (R. Rhamni), were it not for those black spots and apparent blue moons in the lower wings. This is the only one I have seen." In the Catalogus Classicus, p. 2, this species is put by Petiver among the European insects.

Linne described the species, 1763 (not 1764 as stated by Kirby) in Centuria Insectorum p. 23, No. 67. He quotes Petivers figure as "bona" and says: Habitat in America septentrionali, *De Geer*. Therefore a specimen must have existed in De Geer's collection, but this is not described in his memoirs, nor mentioned in Retzius' Catalogue. Linné repeats his description in Syst. Nat. Ed. XII, p. 765. Werneburg has overlooked that Petiver put his species among the European insects, and does not mention it. W. F. Kirby, Synon. Catal. p. 488, quotes the species in brackets, and says; "spec. fict." America. I think it should be examined if the species is still in Petiver's collection which belongs to the British Museum. If it is really fictitious, perhaps the specimen in De Geer's collection came from the same maker. After all De Geer's collection is still preserved and in good condition in Stockholm. I think Linnæus must have had some data to give the country as North America. It is sure that Linné has described another fictitious insect—the famous *Scarabæus Tridentatus*. But here the falsification of blue moons seems somewhat more difficult if not impossible. It occurs to me that perhaps the P. Ecclipsis is an insect near to Colias Caesonia, now not represented in cabinets, or a remarkable variety. At least the above quoted collections should be searched for a more satisfactory explanation.

PAPILIO.

Organ of the New York Entomological Club.

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DESCRIPTION OF NEW SPECIES OF BUTTERFLIES.

Chiefly collected by Mr. Morrison in 1880.

By W. H. Edwards, *Coalburgh, W. Va.*

1. Anthocharis Morrisoni.
2. Melitœa Perdiceas.
3. " Colon.
4. Pyrgus Philetas.
5. Copæodes Eunus.
6. Pamphila Mardon.
7. " Siris.

Anthocharis Morrisoni.

Male. Expands 1.5 inch.

Size of A *Cethura*. Feld. (*Cooperi* of But. N. A. Vol. 1) and very close to it on upper side; color of primaries, white; of secondaries, white, washed with grayish on part of cell and middle of disk, and faintly beyond to hind margin; both wings gray at base. Primaries, have costa spotted black, not densely. The spots nearest to base, rather large and well separated; towards apex, black and white alternate in about equal proportions; on apical area, a large bright orange patch; along apex and hind margin to lower side, the patch a series of black confluent crenated spots. The one on upper median nervule, diffused into an irregular patch; the lower branch of median edged black at extremity; the mark on arc of cell, black; straight, narrow and of even width. Secondaries have a few black scales at the ends of all nervules, and the fringe there is black, otherwise, white; fringe of primaries, also black at ends of nervules.

Under side of primaries, pale yellow-white; the patch, deep yellow, and beyond it a small pink-tinted space towards apex; the nervules on apical area green edged, losing the green scales mostly, quite at the margin; costa marked by black spots at nearly equal distances, about one third the space being black,

two thirds white; cellular mark repeated, interrupted a little below middle; secondaries marbled green, not after the pattern of *Cethura*, but as in A. *Hyantis*, the green being dense, with clear white openings, which are mostly along costal and hind margins. (*Cethura* has the green area much broken, macular, with full half the wing white, and this is yellow washed)

From 2 ♂ from Southern California. Female not observed.

MELITAEA PERDICEAS.

Male. Expands 1.7 inch.

Upper side a dull brown-black, spotted with buff and dull red, the arrangement of the spots being as in *Chalcedon* and allied species; all red dull and inclining to orange, both hind margins edged by a series of red spots, those next apex of primaries a little the largest, the rest nearly equal; on primaries, this is followed by a row of minute spots, red and yellow, mixed; on secondaries, by minute yellow spots, but the two in the median interspaces are considerably larger and lunular; the third row on primaries is sinuous, the spots small, rounded, yellow; the fourth row is also sinuous, red or red and yellow, except the last spot on inner margin, which is yellow; outside arc of cell a demi-row of three spots, yellow edged, without red; in cell a yellow cross bar and a patch near base, and between these, and outside the bar, a few red scales, a large rectangular spot below cell; on secondaries, the third row is obsolete, or represented partially by a slight cluster of yellow scales; the fourth, or discal row, is yellow, and on basal area are four yellow spots, the two in the cell sometimes connected by a narrow ligament on the outer side. Fringes, yellow-white, black at the ends of the nervules.

Under side, dull red over disk of primaries, a shade lighter next base, the hind margins of both wings, dull orange. The second row of spots on primaries repeated in yellow-white, enlarged and now lunular, edged posteriorly by black. The third row repeated, edged anteriorly by black, and the other yellow spots are imperfectly repeated, or are indicated by a lighter shade. Secondaries have a submarginal series of yellow-white lunules, not much excavated, edged on all sides by black (all nervures and branches being black). The next or third row is composed of dull orange lunules. The discal band, broad, yellow, cut by a black line near the outer edge. On basal area five large yellow spots, separated by narrow spaces rather red than orange, or, at least of a lighter color than the orange beyond disk; shoulders, yellow.

Body dull black, red hairs back of head. Below, the thorax covered with long black hairs, abdomen red, with yellow along middle; legs and palpi red; antennæ, brown above, reddish below; club reddish, with a little black at tip.

Female. Expands 1.7 inch. Same color as male, and

marked in a similar manner, only the submarginal lunules of hind wings are decidedly yellow, are larger in proportion, and are deeply excavated.

From 1 ♂ 1 ♀ taken at Mt. Hood, Oreg. Several years ago I received three males of this species from Hayden Expedition in Idaho, but they were so rubbed and damaged that I could make no accurate description of them. I submitted them to Mr. Henry Edwards, and one of them still has his label on the pin with the expressed opinion that it is a new species.

MELITAEA COLON.

Male. Expands 2 inches.

Near to *Chalcedon*, Bois. Upper side black, dusted yellow at base of primaries, spotted with yellow-buff and red. Costal edge of primaries red, all red deep; both wings have a marginal border of red spots, largest next apex of primaries, and diminishing regularly to inner angle. The spots of secondaries small, even-sized, sometimes wholly wanting; followed on primaries by a row of minute spots, mixed red and yellow; on secondaries by a row of small yellow spots,, sometimes more or less wanting. The third row on primaries is sinuous, and made up of small yellow spots, nearly even. The fourth row is also sinuous, not quite parallel to third; approaching it on mid-wing, red, except the spot on costa and the one in sub-median interspace which are yellow or mixed; at end of cell without are three small spots, mixed; in cell a transverse bar and a patch near base, both yellow. Red scales between and outside these spots; a yellow patch below cell. On secondaries the third row is obsolete, a few red or yellow scales indicating the position of some of the missing spots. The fourth row crosses the disk, yellow; on basal area, either four or five yellow spots, according as the two in cell are confluent or not; fringes, buff, black at ends of nervules.

Under side of primaries, bright red from base to margin. The second row of spots represented by yellow lunules on anterior half of the wing, each edged-posteriorly by black. The yellow spots of third row are repeated. The yellow spots in and below cell indicated by a lighter shade of red, and edged on one or both sides by black.

Secondaries still darker red; the marginal band red; then yellow lunules edged above and below with black; then a red band, not made up of confluent lunules, but a nearly even band, with no yellow, and crossing from margin to margin; next a yellow discal band, as broad as the red one, just preceding, cut unequally, and near the posterior edge by a black line; also, edged black on basal side; basal area red, with five yellow spots, the red ground posterior to the spots and also along inner margin forming bands about as wide as the yellow discal band; shoulder yellow.

Body above black, deep red hairs on thorax. Under side of thorax covered with long yellow and grey hairs; abdomen red, yellow along middle; legs and palpi deep red; antennæ red-brown above, red below; club dull red above, with some black, red below.

Female. Expands 2.3 inches,

Upper side black, marked like the male; the spots generally larger. Under side like the male in color. Primaries have the submarginal lunules entirely across the wing, narrow, and deeply excavated. The spots of third row edged black on basal side. Secondaries have the sub-marginal spots almost lanceolate, high, narrow, and deeply excavated, edged above and parted by black.

Form 3 ♂ 2 ♀ taken at Mt. Hood, Oreg. This species may be at once distinguished from *Chalcedon* by the second red band on secondaries, which is here unbroken, not lunular, and is without yellow. In *Chalcedon* this row is made up of red spots, larger or smaller, on black ground, usually more or less edged yellow. The females of *Chalcedon* usually have a yellow central point to the red spot; sometimes the ground is yellow on black, and on this the red spot. I have seen the red belt of *Colon* in no California *Chalcedon*. Also in *Colon* the submarginal yellow lunules on secondaries are of quite another shape from *Chalcedon*, more lanceolate, more deeply excavated. Mr. Morrison took no *Chalcedon*, but many *Colon* at Mt. Hood. I have not seen it from any other locality.

PYRGUS PHILETAS.

Female. Expands 1.2 inch.

Upper side of primaries pale black, of secondaries brown; marked with white much as in P. *tessellata*; the spots smaller; both wings have two parallel rows of dots along the hind margins. Primaries a bent row of spots across the disk; a spot in cell near arc, two or three below cell, and white dashes along costal margin. Secondaries have a discal row of obsolescent spots, mere streaks; fringes of primaries, alternately white and pale black; of secondaries, wholly white.

Under side of primaries, olive-brown on disk, paler towards hind margin; base and basal part of costa whitish; the spots repeated, enlarged. Secondaries white with yellow tint; no discal band as in *tessellata*, the disk and basal area being white, with a few brown dots and streaks, of which three dots on costal margin are most distinct; two streaks across cell; beyond disk are three rows of small or minute spots, the two outer ones corresponding in position to the marginal spots of upper side; these are white, lunular, indistinct, and over them the ground is somewhat dusky; the third, or innermost row consists of brown dots only, at anal angle a dusky patch.

From a single example received in 1879 from the late Mr.

Jacob Boll, and taken by him in Western Texas, on one of his last expeditions. The under side of secondaries is quite unlike any described American species.

COPAEODES EUNUS.

Male. Expands 1 inch.

Upper side light honey-yellow, the hind wings slightly edged fuscous, as also costa of primaries: the ends of all nervules on primaries black for a little distance; costal margin of secondaries dark brown; on primaries a black streak from base for a little way along sub-costal, and behind cell a black oblique streak from origin of upper branch of median across the two median interspaces; fringes, color of wings.

Under side of primaries on disk lighter than above, but towards the hind margin and apex, yellowish, with brown edging to all nervules nearly up to end of cell, rather broad next hind margin and narrowing gradually, costa edged brown. Secondaries yellow, much sprinkled with black scales which largely follow the nervules and branches, but leave a clear yellow space from base through cell to hind margin, and another from base below cell to margin.

From a single male, taken at Mt. Hood. A quite distinct form.

PAMPHILA SIRIS.

Male. Expands 1.15 inch.

Upper side dark brown over whole of secondaries, apex, and hind margin back to cell and stigma of primaries. The rest of primaries fulvous; three fulvous spots in sub-costal interspaces, and an oblique row of three fulvous spots along the top of discoidal and median interspaces; stigma narrow, sinuous, with a deep brown patch behind; inner margin a little fulvous from base nearly to inner angle; on disk of secondaries, a curved narrow band, not distinct, except on mid-wing, color dull fulvous; also, a spot nearer base, indistinct. Fringes cinereous, a little fulvous near inner angle of secondaries.

Under side of primaries brown, dusted with fulvous, and dull fulvous where the upper side was bright; black at base; the spots repeated and more yellow, and the oblique line has a fourth spot; secondaries brown, still more thickly dusted with fulvous scales; a yellow row of spots on disk nearly parallel to costal and hind margins, and a long spot in cell.

Female. Expands 1.28; color of male, but with no fulvous; the spots distinct, clear fulvous, in the oblique line four; a long irregular patch on centerpart of cell; the row on secondaries more distinct. Under side deeper fulvous, almost cinnamon.

From 3 ♂ 3 ♀ taken at Mount Hood, where it seems to replace P. *Mystic*, the nearest allied species.

PAMPHILA MARDON.

Male. Expands 1 inch.

Upper side obscure yellow-fulvous, dusky along hind margin of primaries nearly to cell; three indistinct fulvous spots in subcostal interspaces, and others behind cell, but scarcely distinguishable, in some examples obsolete; stigma rather broad, sinuous, narrowly bordered behind with dull black; secondaries either immaculate or with an obscure fulvous discal band; fringes pale fuscous on primaries, somewhat yellowish on secondaries.

Under side pale ferruginous over secondaries and disk, hind margin and apex of primaries; the inner margin dusky, the base black; the costal spots repeated, two minute spots below these nearer hind margin, and three in oblique row below cell; all these pale fulvous. Secondaries have a discal band of pale fulvous starting on middle of costal margin and curving nearly with the outline of the wing to submedian; a patch on cell.

Female. Expands 1.1 inch.

Upper side color of male, the spots larger and distinct, pale fulvous; a fulvous dash within cell near extremity; under side paler than in male, the spots more yellowish.

From 3 ♂ 3 ♀ taken at Mt. Hood.

In my Catalogue this species would stand next *Agricola*. Bois. It is of broader and less produced forewing, duller color, and without a dusky patch between ends of stigma and apex.

NEW SPECIES OF DICOPIS, CHYTONIX AND SPRAGUEIA.

By A. R. Grote.

Dicopis depilis. n. s,

♀. Smooth, dark grey in color, recalling *Eutolype Rolandi*, but without the metallic tuft of scales on the thorax behind which separates *Eutolype* from *Dicopis*. Interior line fine, black, projected opposite the claviform spot. Claviform with a tinge of yellowish, moderate, somewhat rounded and incompletely ringed with black. Orbicular, spherical, concolorous gray, with a paler ring edging the faint annulus within. Reniform similar, very large, medially constricted. Outer line fine, irregular, waved, much removed outwardly. There is a flecking of yellowish outside of the fine sub-terminal line, which runs very close to the outer median line, at internal angle. Hind wings whitish, with gray shaded edging and fringes; beneath with dot and line. Head and thorax dark gray. Size of *Muralis*, or perhaps a little larger and seemingly stouter. Columbus, Ohio.

The described species of *Dicopis* are becoming more numerous. Excluding Prof. French's *Dicopis Vitis*, which does not belong here, and is a synonym of *Mamestra Distincta*, we have five species. I have seen the type of *Electilis*; it seemed to me near to *Muralis*.

Thaxterianus is distinguishable by the brownish primaries,

and their long oblique exterior margin, as well as by ornamentation ; it is very distinct from the other species. *Damalis*, from California may be known by its blue-grey color. Finally, I have a female specimen from Texas, collected by Belfrage, which comes near to *Depilis*, but may prove a distinct species ; it is numbered "697." *Eutolype Rolandi*, has in both sexes the metallic thoracic tuft, unusual in the moths, and analogous to that found in *Tolype* and *Eudryas*. Our species of *Dicopis* are as follows; *Muraiis*, *Electilis*, *Thaxterianus*, *Damalis*, *Depilis* and possibly an undescribed species from Texas.

CHYTONIX SENSILIS, n. s.

♀. Larger than *Iaspis* and much darker. Eyes naked ; thorax covered with flattened scales; abdomen strongly tufted. Brownish fuscous, with a reddish stain over the subterminal line. Stigmata a little paler than the wing, the reniform medially constricted, enclosing a black shade, separated into an upper and lower spot. Lines black, uneven, rather wide apart. T. p. line running outwardly below costal edge, thence downwardly and outwardly obliquely to over median nervules, with a slight indentation opposite the cell. Below vein 3 it runs a little inwardly and thence straightly to internal margin. Attached to it on the submedian fold is an elongate, squarish, pure white spot. Subterminal line uneven, toothed over median nervules. Hind wings, blackish fuscous. Beneath paler, with a continuous dark, extra mesial line and shade; on fore wings the slight discal mark is surmounted by a dark costal shade spot. Discal spot on secondaries a small annulus. *Expanse* 31 mil. Massachusetts, in Mr. Thaxter's collection. I also saw a specimen determined as "*iaspis*" in the collection of the Boston Society of Natural History. I mention this because this erroneous determination is probably still more widely spread. Guenee's *Apamea Iaspis*, the type of *Chytonix*, is related, however, to *Jaspidea* (*Bryophila*). Indeed, it may be only a variety of his *Bryophila Palliatricula*. Both have a black sub-median dash across the median space, and the vague white shading over median space above in *Palliatricula* absorbs the small white dot of *Iaspis*. I have referred both species to *Chytonix* elsewhere. In the present form the white spot is more elongate. The color is more reddish brown and the insect faintly resembles *Dryobota Stigmata*. The ground color of *Sensilis* is a somewhat pale, brownish fuscous, shaded with darker at the base and on the median space inferiorly. In the disposition of the darker shades there is a parity with *Iaspis* and *Palliatricula*, but there is a red-brown tone wanting in its allies, while the insect is darker and larger. The t. p. line is not so rounded opposite the cell, the inner line not so oblique, waved, with a sub-median indentation ; the lines do not appear so widely separate in *sensilis* as in its allies.

That our determination of *Iaspis* admits of no doubt, follows from Guenee's description. He calls the color "very pale testaceous grey," and the body "slender." The rest of his description falls in with our specimens, of which I took several males in the vicinity of Buffalo in July. In arranging our Noctuidæ I saw at once that Guenee's *Apamea Iaspis* could not remain in the same genus with his other species, which are mainly Hadenas, and I made it the type of a new genus. Only later I saw its affinity with Guenee's *Bryophila Palliatricula*, although so widely separated by him, and I divided it on the character of mixed and flattened scales on the thorax. I believe the genus containing *Iaspis*, *Palliatricula*, (if these two are distinct) and *Sensilis* should be placed next to *Bryophila*, but until the European species are all compared its exact value cannot be ascertained. The species are more robust and have a somewhat Hadeniform appearance. They all have a white spot attached to the t. p. line, while it is lost in the white shading of the median space in *Palliatricula*.

SPRAGUEIA PARDALIS. n. s.

Allied to *Dama*, by the orange fringes, which are flecked with black opposite the cell. Fore wings black, with a large, pale yellow oblique costal patch before the t. a. line; another on the median space enclosing a dark dot, and a smaller spot before the apex. Median lines broad, orange, only marked on the lower half of the wing. Hind wings blackish. The outer smaller pale spot on centre of primaries surmounts a little patch of orange and then some brown-black scales. These deep brown-black scales obtain below the larger median pale costal patch and cover the upper extremity of the outer median orange line. Front smooth, bulged. Collar edged with orange. Head behind, orange. Tegulæ orange within; the shoulders blue-black. Abdomen blackish, finely annulate with pale. Beneath, the body is pale yellow. *Expanse* 17 mil. Florida, several specimens collected by Mr. Roland Thaxter.

This species is more black than any of the others and is easily recognized by the pale white costal spots extending to the middle of the wing. For a discussion of the structure of *Spragueia* and allied North American genera I refer the student to a paper published in the Canadian Entomologist, Vol. XI, p. 231.

ON SOME APPARENTLY NEW FORMS OF DIURNAL LEPIDOPTERA.

By Henry Edwards.

ANTHOCARIS COLORADENSIS. n. sp. (?)

I have long had in my possession a ♂ example of Anthocaris, which appears to be distinct from any known form, but I hesitated to describe it until more material might present itself.

From Dr. Bailey of Albany, I now receive a ♀ exactly agreeing with my specimen, and I have also seen other examples in the collection of Messrs. Neumoegen and Mead. I therefore offer a description under the above name. Compared with *A. ausoniedes*, Bois. of which it is possibly a variety—it has the apices more rounded, and the wings, both primaries and secondaries, broader, though the average size of the insect is a little less. The broken patch at the apex of the fore wings, is, in the present form, deep velvety black, flecked with greenish scales, while in *A. ausoniedes* it is olivaceous, with yellowish scales. The patch is also more compact, less divided by the white ground color of the wings, the apex being therefore almost wholly black, with the exception of a roundish spot, costally, and a couple of dashes marginally, of the white ground color. On the under side, the marbled pattern of the secondaries is more extended over the whole surface of the wing, thus more closely approaching the design of *A. Crensa*, and *A. Hyantis*.

The present form appears to bear the same relations to *A. ausoniedes* that *A. Belia* does to *A. ausonia* of Europe. The specimens I have examined (4 ♂ 3 ♀) were all taken in Colorado.

Types. Coll. Hy. Edwards. Dr. Jas. A. Bailey.

COENONYMPHA CALIFORNICA. Doub. n. var. *pulla*.

Entirely of a dark fawn color, with a leaden tint on the upper surface, and a blackish cloud at the base of primaries, as in the var. *galactinus*. The markings of the under side are invisible, when viewed from above. Beneath, dull brown, with a reddish tint on the discal region of the primaries, the markings very indistinct, being lost in the prevailing dark color.

1 ♂ San Mateo, Co., Cal.

Type. Coll. Hy. Edwards.

MELITÆA DWINELLEI. n. var.

Most of the California species of *Melitœa* are prone to extreme variations, and none more so than the most beautiful of all, *M. chalcedon*. I have before me examples of a form, however, which is so remote from the typical specimens, and so constant in its characters, as to deserve a name. I have desired to link with it the memory of an esteemed friend, now passed away, viz: Mr. Herman Dwinelle, one of the most promising young entomologists of the Pacific coast, whose early death was a loss to science. The specimens of this butterfly were taken by Mr. Dwinelle at the McCloud fishing station, Shasta Co., Cal., and it is worthy of remark, that no examples of *Chalcedon* agreeing with the form common throughout the valleys of California, were found among the insects taken in the above locality. My examples are 4 ♂. 3 ♀

Primaries very much suffused with red, which color predominates over the discal portion, and toward the apices, almost obscuring the usual white spots, or rendering them a sordid, dull

orange color. The secondaries have the marginal row of red spots clearly defined, but the sub-marginal row of white lunules, so strongly characteristic of *M. Chalcedon*, is here wholly absent, or reduced to a single row of small, white sub-ovate patches, thus leaving a broad, black field between the margin and the median band. Beneath, the upper wings are reddish over the whole surface as in *M. Chalcedon*, but the lower have a much larger space of yellowish white toward the base, the whole of the red band and blotches being more broadly edged with black.

MELITÆA BARONI. n. sp. (?)

Allied to *M. Quino Behr.* of which it may be a variety. The lower side is characterised by an intense reddish color over the whole surface, sometimes attended by great suffusion, while the black lines usually found above and below the reddish maculate bands, are either wholly wanting, or very faintly defined, and except in the space surrounding the central patches of the superiors, there is no black to be seen. I have examined about 40 examples of this form from Mendocino Co., Cal,, all with this peculiar system of coloration, and I have found these characters constant in every specimen, while the typical form of *M. Quino.* which *M. Baroni* resembles so closely on the upper side, has all the mark. ings of the lower, broadly and conspicuously edged with black. It will be found quite an easy matter to se parate these two species-

MELITÆA RUBICUNDA, n. var.

This is also, probably, another departure from the type of *M. Quino*, and may be its mountain form. In shape it is like *M. Quino*, and there is scarcely any appreciable difference on the lower side, but above the coloration is different. In *M. Quino*, black abounds, and overshadows both white and red. In this form red is the prevailing tint, and the submarginal bands of the secondaries are simply bands of red, cut by the nervules as in *M. Quino*, consisting of rows of spots. There is also a greater proportion of white about the base of the secondaries. My specimens, (18 in number) all agree in these characters. They are all from the Sierra Nevada, at an elevation of from 2500 feet to 7000 feet, while the typical *M Quino* is found nearer the sea level. *M. rubicunda* approaches somewhat closely to *M. nubigena*, Behr. It is doubtless so named in many collections, but it is not so entirely suffused with red, as the latter species, while the wings are broader, with the apices more rounded.

MELITÆA ANICIA. Doubl.

This species may be known by its narrow wings, with very pointed apices, as well as by the large proportion of white on the upper surface, and the almost utter obliteration of the red submarginal maculate band of secondaries. A strongly marked variety is occasionally found which I designate as

MELITÆA WHEELERI. n. var.

It is wholly of a pale red ground color on the upper surface, except the base of secondaries, which are cream white. The markings are as usual, but with very little black.

2 ♂. 1 ♀. Southern Nevada. Wheeler Expd'n.

Types. Coll. Hy. Edwards.

THECLA CITIMA. n. var.

A peculiar form of *T. crysalus*, Edw., in which the orange blotches at the inner angle of the primaries, and the anal angle of secondaries are all obsolete, or at best, very faintly indicated, The whole of the upper surface, therefore, being purple and black. The ground color of the underside is ash grey, instead of fawn color, and the markings are all much less pronounced than in *T. crysalus*, the orange points of both primaries and secondaries being almost wanting.

1 ♀. Mt. Nebo. Utah. Mr. J. D. Putnam.

1 ♀. S. W. Colorado. H. K. Morrison.

Types. Coll. Hy. Edwards. B. Neumoegen.

THECLA SPADIX. n. sp.

Size of *T. Putnami*, and allied to that species. Upper side, dull mouse color, darkest at the base, with a large chestnut shade on primaries, and entirely without other markings. Beneath, the usual bands on primaries are utterly obliterated. On the secondaries is a very faint sub-median band irregularly broken, and an equally faint discal spot. The marginal band is also indistinct. The lunules of the anal angle are dull brown, enclosing 3 patches of black and white scales. There is no trace of either yellow or blue. The abdominal hairs are grayish white.

Exp. wings, 1.00 inch.

2 ♀. Tehachepi Pass, S. California. R. H. Stretch.

THECLA NELSONI. Bdv. n. var. *exoleta*

I distinguish under this name a form of *T. Nelsoni*, in which the whole of the lower surface is dull chestnut brown, with the marginal lunules of the secondaries exceedingly indistinct. The narrow white median band of secondaries, and the sub-marginal band of primaries are entirely wanting. In all other respects it resembles the typical form.

2 ♀. Big Trees, Calaveras Co., Cal.

Types. Coll. Hy. Edwards.

THECLA MUIRI. Hy. Edw. n. sp.

Allied to *T. Nelsoni*, Bdv., but undoubtedly distinct. It is smaller, with the apices of the wing not much produced. The general color is darker than that of *T. Nelsoni*, and the fringes are concolorous with the wings, instead of white. Beneath, on primaries, is a very distinct, sub-marginal white band, perfectly straight, and not curved from the costa, as in *T. Nelsoni*. It is also placed very much closer to the margin of the wing. The secondaries are blackish brown and not chestnut, as in *T. Nelsoni*,

and the sub-marginal band of white spots is more distinctly angular about the middle. It is also edged interiorly with a deep brown shade. Outside of this band, a purplish tint encloses the lunules, which are slate color, edged above with a few orange scales.

Exp. wings. 0.85 inch.

1 ♂ 1 ♀. Mendocino Co., Cal.

Types. Coll. Hy. Edwards.

I have named this exquisite little species after my friend, John Muir, so well known for his researches into the geology of the Sierra Nevada, who has frequently added rare and interesting species to my collection.

THECLA IRUS. n. var. *Mossii.* Hy. Edw.

Upper surface entirely bright chestnut brown, a little clouded with dusky at the apices, and on the extreme margins. Fringes wholly white, and not alternately brown and white, as in *T. Irus*, and the varieties *Henrici* and *Arsace.* Tails wanting. Under side, primaries reddish-brown, darkest at the base, and brightest at the margin. From costa entirely across the wing is a sinuous white band, bent outwardly at the middle, and edged above by a deep chestnut brown shade. The secondaries have the base deep blackish-brown of uniform color, above the usual sinuous band, which is narrow, whitish, with a very large and sharp angle at the median nerve. The marginal spots are large, distinct, bright chestnut brown, 6 in number, each surmounted by a small black lunule.

Exp. wings. 0.80 inch.

1 ♂. Esquimalt, Vancouver Island. Dr. Moss.

Type. Coll. Hy. Edwards.

I have for the present regarded this as a variety of *T. Irus*, but it is quite possible that it is a distinct species; the uniform deep brown base of secondaries giving it a most peculiar appearance. It is at any rate farther removed from the typical *T. Irus*, than either *Arsace* or *Henrici.*

THECLA TACITA, n. sp.

Allied to *T. adenostomatis*, Hy. Edw. Upper surface wholly pale plumbeous, a little darker at the margin, discal patch and the nervules also deeper in shade, and very distinctly marked. Tails of secondaries very small, linear, edged with white. Near the anal angle is a small and faint ochraceous shade; fringes of both wings sordid white; lower side paler than the upper, with very faint submarginal line of blackish lunules, and a median curved line of ovate spots equally faint; there is a black spot on the fringe at the extreme anal angle, followed by a patch of bluish scales, and a very pale yellowish triangular spot, narrowly edged with black; the whole of the markings are indistinct.

Head with white line at base of the eyes, and two small

white dots at the insertion of the antennæ. Thorax and abdomen concolorous with the wings, the latter paler beneath. Tarsi ringed with white; hairs at base of legs bluish. Antennæ with white rings, club black, with the apex dull orange.

Exp. wings 1.00 inch. 1 ♂.

Mendocino Co., Cal. Mr. O. Baron.

Type. Coll. W. H. Edwards.

LYCÆNA SPECIOSA, Hy. Edw.

I had the pleasure of describing the ♂ of this beautiful little species in the Proc. Cal. Acad. Sc., Dec. 1876, but as that publication may not be accessible to the readers of PAPILIO, I copy the original description, and through the kindness of Mr. W. H. Edwards, am enabled to add that of the ♀ also, two specimens (♂ ♀) of this apparently rare butterfly having recently been taken in S. California by Mr. H. K. Morrison.

♂ "Pale silvery blue, somewhat the color of *L. melissa*, Edw., with the extreme margins black. Fringes, very broad, clear white, cut very distinctly by black at the ends of the nervules. Underside, pale silvery gray, with a very minute round black spot on the costa, and a series of five round sub-marginal and one oblong central spots arranged almost in circular form on the disc. There is also a distinct oblong discal spot, and a smaller round one on the internal margin. The whole of the spots on the primaries are comparatively large, very distinct, and jet black, without white margins. The secondaries have one basal dot, a minute discal point and a sub-marginal row of seven small black spots, also without white margins. Fringes, as in the upper side. Antennæ, with the club unusually large, and the shaft distinctly annulated with white. Thorax and abdomen, blackish above, silvery beneath.

Exp. of wings, 0.70 inches.

Havilah, Kern County, R. H. Stretch. (1 ♂ Coll. Hy. Edw.)

I should have hesitated to describe this exquisite specie from a single specimen, but the peculiar arrangement of the spots on the lower side of the primaries, its extremely small size, and the broad and distinctly black and white fringes serve abundantly to distinguish it from any other form with which I am acquainted." Proc. Cal. Acad. Sc. 1876.

♀ Upper surface, dull smoky black, with the fringes white, alternated with black, and some bluish scales at base of wings, and sides of thorax and abdomen. Under side, pale silvery grey, with brownish irrorations, internal margin of primaries broadly blackish. The spots on the forewings are unusually large and very clearly defined.

I think this species should be placed near to Lyc. Regia, Bois.

NOTES AND DESCRIPTIONS OF A FEW LEPIDOPTEROUS LARVÆ.

By D. W. Coquillett.

Chamyris cerintha, Triet.—Body nearly naked, a purple dorsal stripe, next to this is a pinkish line, below which is a broad greenish stripe; 16 legs, head gray, length 28 mm. Feeds on apple. One of these caterpillars assumed the chrysalis form on the 9th day of August, producing the imago May 28, of the following year.

Apatela brumosa, Guenee.—Body black, marked with a broad yellowish-brown stigmatal stripe; hair in spreading clusters from warts, that upon each end of the body being yellow, the rest white; 16 legs, head black; length 38 mm. Feeds on plum and hazel; spins a thin tough cocoon. Two of these caterpillars assumed the chrysalis form in September, propucing the imagos in the last week in April and first week in May of the following year.

Heliothis luteitinctus, Grote.—Body naked, light green, a dark dorsal line, on each side of the body are two white lines, 16 legs, head green; length 30 mm. One specimen taken on grass assumed the chrysalis form July 14, producing the imago on the 5th of the following month.

Scoliopteryx libatrix, Linn.—Body very slender, green, with a white line on each side, 16 legs; length 40 mm. Feeds on willow. One specimen spun its cocoon August 23, producing the imago on the 7th of the following month.

Catocala coccinata, Grote.—Body dark gray. a curved fleshy projection on top of segment 8; segment 11 slightly raised, with two tubercles on the top; a row of small prickles on the dorsal space, 16 legs, a black spot beneath each of the segments which bear the four pairs of abdominal legs, head gray, bordered with black; length 62 mm. Feeds on oak. One specimen spun its cocoon June 6, producing the imago the 30th of the same month.

Caterva catenaria, Drury.—Body very pale yellowish, or greenish white, sub-dorsal and stigmatal space marked with four black lines; on each side of segments from 4 to 11 are two black spots between which is a whitish tubercle tipped with black; first segment yellowish, marked with about 12 black dots; venter, pale yellow, marked with six wavy black lines; 10 legs, head large, pale greenish yellow, marked on each side with about 6 black dots, length 38 mm. Feeds on hazel. Several specimens taken July 14 spun their cocoons about August 18, producing the imagos September 11.

Eupithecia interruptofasciata, Packard.—Body greenish or yellowish, a brownish dorsal and sub-dorsal line, the latter

sometimes obsolete, the dorsal line sometimes interrupted by a row of brownish spots; a brownish or yellowish line below the spiracles; venter greenish, with a light or yellowish line in the middle; 10 legs; head brown or greenish, sometimes marked with about four vertical brown dashes; length 15 mm. Feeds on clover. Found from June to September.

NOTES ON CATOCALA SAPPHO, STRECKER.

By G. H. French, *Carbondale, Ill.*

Mr. Strecker, in noticing this beautiful species (part 11 of his Lep. Rhop. et Het.) intimates that he hesitated as to the propriety of describing it as a species, as he thought it might prove to be but a variety of *Agrippina*. Mr. G. D. Hulst, in commenting on the species in his "Catalogue of the Catocalae of North America, with Notes," (No. 2, vol. 3, of Bulletin, Brooklyn Ent. Soc.) says, "We incline very strongly to the opinion suggested by Mr. Strecker when he described it, that this very charming insect is but an extreme variety of *Agrippina*."

I can see why the namer of the species should hesitate when he already had a form of *Agrippina* with primaries suffused with white, and before him, perhaps, only a single specimen of *Sappho;* but my observations do not confirm his fears. As this is a very rare insect, and as I have been so fortunate as to capture two specimens, I will give briefly my reasons for believing it to be distinct from the allied form *Agrippina*. First. I do not know that *Agrippina* has ever been found in this State. I have hunted this region thoroughly, taking over forty different species of *Catocala*, and have never found it. Besides this, I have by considerable research and correspondence, been making a list of the *Catocalae* of Illinois, and I do not find that any one else has taken that species here.

The two specimens of *Sappho* above referred to, are as nearly alike as two specimens of *Desperata* or any other well marked species, the primaries having the two black patches extending from the costa, well defined; these and all the other marks agreeing with the figure accompanying Mr. Strecker's description. To find so well marked a form in such widely separated localities as Texas, Georgia and Illinois, all the examples agreeing with each other, and with no intergrades is in my mind, strong proof of its specific value. *Cara*, *Lachrymosa* and others have their well marked varieties, but in the extreme forms they usually vary somewhat, while the intergrades are more common than the extreme varieties. For these reasons, I am of the opinion that *Sappho* is a good species.

NEW NOCTUIDÆ FROM WASHINGTON TERRITORY.

By A. R. Grote.

The following species are among the collection made by Mr. Morrison last season in Washington Territory:

Mamestra Liquida, n. s.

♂ ♀. Eyes hairy; abdomen untufted or but very slightly so at base. Allied to *Lilacina Legitima*. Forewings brown with the subterminal space widely shaded with bright lilac gray, the internal margin similarly shaded and also the t. a. line. The costal region of the subterminal interspace is left brown and the light gray shade passes over to apices. The s. t. line itself is pale, distinct, yellowish with the M-mark well indicated, thus distinguishing the moth from *Lilacina;* I find, however, that in *Legitima* the M-mark is variably distinct. Claviform spot outlined in velvety black; a blackish mark above and below vein 2 on t. p. line; vein 2 is marked by whitish scales. The median field is tinted with reddish which stains the reniform and extends beyond it. Orbicular, oval, a little oblique, gray with dark centre. Terminal space dark brown; a dark shade relieves the s. t. line on the inside. Fringes dark, cut with pale. Hind wings yellowish fuscous, with diffuse darker terminal shade; fringes concolorous. Beneath, the four wings show discal points while the lines are obsolete. *Expanse* 37 mil.

This species presents the same pattern as *Legitima*, the transverse lines are similar. It is not so red, and in the orbicular approaches rather *Lilacina*, while distinct in detail from either.

Valeria? Conserta, n. s.

♀. Eyes naked; tibiæ unarmed. Abdomen tufted; vestiture coarse; thorax untufted. Blackish gray. Fore wings suffused with black. Lines black, thick, lost in blackish ground color. Base whitish gray. Inception of transverse anterior line distinct; the line shows an inward subcostal tooth. Stigmata obsolete. Terminal space gray with a terminal series of black dots at base of fringes. Hind wings soiled with blackish; beneath with a dotted extra mesial line and a discal mark. Collar white at base with a black line. Thorax blackish with the edge of the collar and the tip of the patagia shaded with gray. Abdominal tufts blackish. *Expanse* 34 mil.

From the structure of the thorax I am doubtful of the generic references. The species is so easily recognized that I describe it, and without recognizing the male.

Hadena semilunata. n. s.

Eyes naked; tibiæ unarmed. Thorax hairy, (the specimens are not well enough preserved to show the tufts.) The species has somewhat the look of an *Anarta* (*Sympistis*). Fore-wings blackish, with the lines edged with white. Orbicular oblique,

elongate, edged broadly with white, with dark centre. Reniform upright, kidney shaped, blackish, with fine white annulus. T. p. line angulate opposite the cell. Sub-terminal line white, with a small W mark between veins 3 and 4. Hind wings yellow, with black borders and a well marked discal lunule; costal margin soiled, as are the veins. Beneath yellowish, with the four lunules evident. Fringes of primaries blackish, neatly cut with pale opposite the veins. *Expanse 28 mil.*

The white lines on the primaries contrast, and there is a whitish shade on median field between the sub-median fold and median vein. The species resembles as little our Eastern *Hadeua inordinata.*

The collections from Washington Territory contain many species originally described from California and Vancouver Island Since Mr. Morrison has sent me two of these as new species, I make here a partial list of these forms, so that the attention of those interested may be called to the matter. It seems to me probable that *Hadena cymosa* from Washington Territory is only a dark form of *Hadena castanea* from California.

Mamestra cuneata,
" cinnabarina,
Hadena indirecta,
" divesta,
" curvata,
" semilunata.
Xylomiges crucialis,
Deva palligera,
Behrensia conchiformis,
Plusia labrosa,
Actinotia Stewarti.

ON PAPILIO ECCLIPSIS LINN.

By Arthur G. Butler.

In part 3 of Papilio, Dr. Hagen calls attention to this species as one requiring identification, and suggests that it may be an insect (allied to Meganostoma cesonia) which remains to be discovered. If Dr. Hagen will turn to p. 226 of my "Catalogue of Diurnal Lepidoptera, described by Fabricius," he will find the following note respecting it. "P. ecclipsis, even in Petiver's figure, looks like a manufactured insect, and two cleverly painted specimens in the Linnean cabinet prove it to be so. Petiver described it as "Pap. sulphureus, lunulis cæruleis," etc. and placed it among his animals of Europe in the index to his work. Linneus, however, gave the locality" in America septemtrionali."

The specimens in question are stippled with thick body-color, and seen without a lens, might easily have deceived the older authors. In Petiver's collection there is nothing which at all resembles his figure; he has however a specimen of G. Rhamni, which may be the type of P. ecclipsis, washed clean, but it is quite possible that one of the specimens in the Linnean cabinet is Petiver's type.

British Museum, March 30, 1881.

NOTES ON THE PACIFIC COAST SPECIES OF ORGYIA, WITH DESCRIPTIONS OF LARVÆ AND NEW FORMS.

By Henry Edwards.

Four species of the genus Orgyia, are known by me to exist in California and the adjacent states, two of which appear to be as yet unknown to science. though one of them stands in such puzzling relationship to an allied form, that it is almost impossible to assign its true position as a species. The remarkable difference in the larval stage (which appears to be constant in both instances), is our only reliable guide as to the specific value of either, and a reference must be made to the early conditions of both insects, by those who wish for a perfect understanding of their relations to each other. The food plant is different in these two forms, and one (*O. vetusta*) is extremely rare where the other (*O. gulosa*) is found in abundance, while *O. gulosa* is not met with at all in the district in which *O. vetusta* is common. It is possible that both of these forms were known to Boisduval, and it is difficult to state positively which he intended to describe as *O. vetusta*, but a specimen which I had the opportunity to examine in the collection of Mr. Lorquin, of San Francisco, (by whose father most of the Lepidoptera of California, described by Dr. Boisduval had been collected), was decidedly belonging to the larger and more frequent form, and it is from this standpoint that the present paper is written.

I append descriptions of the larva as well as of the imago, of both of these closely allied forms.

Orgyia vetusta. Bois.

Larva. Full grown.

Ground color, velvety black. Head black, rather shining with a yellow line in front; mouth parts bright yellow. From the second segment spring two bundles of long black hairs, as in all the species of the genus. The space between these is bright vermillion red; at the base of each segment is a series of 4 or 6 orange yellow dots, extended also to the sides; 3rd and anterior part of 4th more broadly and distinctly patched with orange. From the dorsum of 5th, 6th, 7th and 8th spring bundles of long silky hairs, whitish drab at their base, chestnut towards their tips. Along the lateral region is a double row of bright red tubercles, and on the 3rd, 4th, 10th, 11th and 12th, these extend across the body, 6 tubercles appearing on each segment. Out of these spring a series of long yellowish white hairs, sparsely interspersed with black, and becoming more decidedly yellow laterally. From the centre of 12th segment, a bundle of long yellow hairs, tufted with black; under side blackish; feet and pro-legs orange yellow, with the claws black.

Length 1.00 inch.

Food plant. Lupinus of various species, chiefly *L. arboraceus*, Sims. San Francisco to San Jose, common. Changed to chrysalis May 26. Imago emerged June 6. *Chrysalis*. Pitchy brown shining, with a few short bunches of hairs on sides of middle segments. The chrysalis is oblong oval, and is enclosed in a yellowish drab cocoon, closely spun, and composed of the paler hairs of the larva, with a few black ones intermixed, the paler ends of these hairs being always nearest the surface. The chrysalis is indistinctly seen through the web.

IMAGO.

"Forewings banded with fuscous, paler at the base with white spot at anal angle; hind wings reddish fuscous." Boisduval, Lep. de la Calif. p. 28.

The primaries in this species are decidedly a rich brown, slightly paler at the base, and with a grayish reflection when viewed obliquely. The white spot on inner angle is very distinct, and in the centre of the wing is a grayish space reaching to the costa, and in some specimens very pale and distinct. The usual lines are all very clearly defined. The secondaries are redder than the upper wings, and are concolorous with the abdomen.

Exp. wings, 1.15 inch.

ORGYIA GULOSA. Hy. Edw. n. sp. (?)

Larva. Full grown.

Ground color, as in *O. vetusta*, velvety black. Head jet black, without the yellow frontal line, and with the mouth parts dull yellow. 2d segment with the usual complex series of black hairs. Between them are two dark brick red tubercles. 3d has two orange central tubercles, and two brick red ones on the sides. 4th has black central tuft, with two brick red tubercles on each side of it. 5th, 6th and 7th, have each a white central tuft, with two brick red tubercles on each side. 8th, 9th, and 10th, each with six brick red tubercles. 11th, has a central tuft of black hairs, directed posteriorly, with two brick red tubercles on each side. 12th has only two brick red tubercles. Anal segment black. From the base of all the red tubercles arise bundles of black and white hairs, almost wholly white on the sides. Between the 7th and 8th segments are some bright orange dashes, which marks are also indistinctly seen on the anterior segments.

Length, 0.60 inch.

Food plant. Quercus, of various species.

Contra Costa Co., Cal., abundant, extending through the foothills of the Coast range as far as Shasta.

IMAGO.

The differences in the perfect condition of these two forms, appear to me as follows: *O. gulosa* is always much smaller than *O. vetusta*. The white spot near the inner angle is less distinct,

and the lines on the primaries are invariably more clouded and confused. The ♀ is also much smaller than that of *O. vetusta*, and is brownish instead of smoky gray. I have frequently kept the larvæ of both forms, and have found that *O. vetusta* would not feed upon the oak, and *O. gulosa* would invariably refuse the lupins. All the species of the genus are ravenous eaters. This is probably a case in which two distinct species approach each other very closely in the imago condition.

Exp. of wings, 0.75 inch.

ORGYIA CANA. Hy. Edw. n. sp.

Allied to *O. leucostigma*, Sm. Abb. but differing from that species, by the absence of the white spot on the inner angle, and by the heavier and less oblique transverse lines on the primaries. The secondaries are also of a chestnut tint, and not concolorous as in *O. leucostigma*.

2 ♂ Havilah, California. R. H. Stretch.

Types. Coll. Hy. Edwards.

ORGYIA BADIA. Hy. Edw. Proc. Cal. Ac. Sc.

A careful comparison of the examples of this sp. in my collection, leads me to the conclusion that it is the same as *O. antiqua*, L. of Europe and it is more than possible that *O. nova*. Fitch, belongs to the same species.

PAPILIO.

Organ of the New York Entomological Club.

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NOTES ON THE GENUS CLISIOCAMPA, CURTIS.

With description of New Species.

BY R. H. STRETCH.

Probably there is no group of Bombycidæ inhabiting this country more worthy of earnest study than the one now under consideration. In an economical point of view, the agriculturist and the pomologist are liable to their attacks, while many of our ornamental trees and shrubs are marked by the depredations of the caterpillars. Their great abundance in certain seasons, and their extremely interesting habits, also serve to draw attention to these insects, while the difficulty which exists in clearly defining the various species, offers another incentive to the investigations of entomologists.

In studying the genus, we must depend chiefly on the transformations for the separation of species, and where these are unknown, not so much on color as on the structure and proportion of the markings, as the species are very variable and approach each other closely in the imagines.

The descriptions of some of the earlier stages are now, I believe, given for the first time. The genus has, undoubtedly been very properly separated from *Gastropacha* and from *Bombyx*, which latter included insects of different structure and of extremely different habits. *Clisiocampa* is thus well defined by Stainton:

IMAGO.

"Antennæ pectinated in the ♂, ciliated in the ♀; abdomen of ♀ rather stout and pointed; wings densely clothed with scales. Larva gregarious when young, dispersing before becoming full fed. Pupa enclosed in a cocoon of moderately fine texture, not transparent, because intermixed with a sulphur colored powder."

CLISIOCAMPA, CURTIS, Brit. Ent., Vol. 5.

C. CALIFORNICA, Packard, Proc. Ent. Soc., Phil., vol. 3, p. 387, (1864). *Bombyx pseudoneustria*, Boisduval, *Ann. Soc. Ent., Belg.*, vol. 12, p. 82, (1868-9).

Larva. Head black, legs black; feet on abdominal legs pale testaceous. Body black, faintly dusted with rusty, which forms an exceedingly broken and indistinct lateral line, and a more complete double dorsal line. Each segment carries a lateral, transverse, very faint linear dot, above the lateral line. The dorsal and lateral hairs are all tawny. The general appearance of the larva is tawny brown. Length about 1.40 inches.

Cocoon. The cocoon is constructed in the crevices of bark or in the angles of masonry where accessible, and consists of a loose, white web, in which is suspended the long ovate cocoon of dense papery consistency, thickened with a yellowish powdery gum.

This species is exceedingly abundant in the neighborhood of San Francisco, and is probably widely distributed. In this vicinity its favorite food plant is a species of scrubby oak (*Q.agrifolia*), but it is sometimes found on the blackberry (*Rubus*) and other shrubby plants. Its depredations do not seem to have extended to the orchards. The nests may be seen in warm localities as early as the middle of March, while in those more exposed they are not seen till the middle of April; but both these dates are sufficiently early to protect the orchards. The larvæ pupate in about six weeks from the egg, and the imago appears in about a fortnight.

The peculiar actions of these larvæ would appear to indicate the possession of organs of hearing. It is most amusing to stand near one of the nests on which the larvæ are clustered, and call out loudly and sharply. The larvæ begin to twitch convulsively, throwing the head from side to side as if annoyed by the sound; and if the sound is repeated, not unfrequently losing their foothold and falling to the ground. I do not remember to have seen any note of this peculiarity as common to the species found in the Atlantic States, and mention it to draw attention to what may prove an easy means of collecting the larvæ in orchards when they become troublesome.

C. FRAGILIS, n. sp.

♂ General color, soft chocolate brown. The primaries have a deep shade of this color at the base. The lines are whitish, and in strong contrast with the ground color of the wing. The inner band reaches the inner margin very near to the base, and curves slightly inward on the costa. The outer band is nearly parallel with the inner, the space between them being slightly increased at the costa. Fringes whitish, with dark dashes at the termina-

tion of subcostal and median nervules. Secondaries wholly pale chocolate brown, with no indication of band. Underside pale brown with a reddish tinge, and with very faint trace of median band on both wings. Thorax and abdomen somewhat paler than the base of the primaries. Antennæ, dark chocolate brown. Exp. wings, 0.80 inch.

♀ Lighter in color, and less opaque than the ♂. Head, thorax, legs and abdomen pale whitish brown; abdomen palest; prothorax and tegulæ darkest. Anterior wings pale, lustrous whitish brown, crossed by a broad dark band of the same color, but of a deeper shade. The inner edge of this band originates on the inner edge near the base, and curves round to the costa, which is reached at the basal two-fifths. The outer edge of the band is parallel with the outer edge of the wing, and curves outward as it reaches the costa, being followed outwardly by a narrow pale line. The band is palest centrally, and broader than the terminal space, and both its margins are toothed inwardly on the nervules.

Posterior wings concolorous with the band on the primaries, crossed by a pale median band.

Beneath, the wings are concolorous with the band on the primaries above, and the only markings are the pale whitish line outside the band on the primaries, and the median line on the secondaries, which are both more prominent than above.

3 ♂, 4 ♀

Expanse of wings, 1.10 to 1.40 inches, *Length of body*, 0.40 to 0.50 inches.

Habitat, Virginia City, Nevada (Henry Edwards).

This species is very strongly marked, and readily distinguishable from all its congeners by its delicate, fragile appearance, and the thin lustrous squamation of the wings.

Taken by Mr. Henry Edwards in the early part of July. Mr. Edwards found, during the same visit to the locality mentioned, a single larva belonging to this genus feeding on a large species of sunflower (*Helianthus* ——), which I have little doubt belongs to this species. It was smaller than those of *C. californica*, and more like that of *C. constricta*, but abundantly distinct from either. It came to my hands through the mail in such a condition as not to admit of a careful description. The only trees growing in the region from which this species was received, are various species of willows or conifers.

C. CONSTRICTA, n. sp.

Larva. Head blueish, mottled with black. Body with a moderately broad, irregular, but continuous bright ochreous dorsal stripe bordered with black. Sides blueish white, faintly mottled with black, this color being concentrated into a diffuse lateral stripe just above the lateral bunches of hairs. From the dorsal stripe spring dark tawny hairs, directed upwards, with a few black

hairs in the black margin of the stripe. Each segment on its anterior edge has a lateral bunch of white hairs directed downwards, and above the feet there is a continuous line of depressed white hairs. Beneath, the body is smoky. Abdominal legs smoky, testaceous at tips. Length, 1.25 to 1.50 inches.

Varies in the brilliancy of the dorsal stripe and the intensity of the color in the lateral black stripe. Beneath the black stripe there is in strongly marked individuals (usually small ♂?) a faint, pale whitish ochre, broken, slender stripe, and the fold above the feet is of the same color.

The larvæ from which the foregoing description was drawn were late specimens, mostly ichneumonized. They were found May 27, at which time many cocoons were found empty. The cocoon is whiter than that of *C. californica.*

Imago ♂. Entire insect dark cream color with a faint tinge of reddish brown; the front of the head, and thorax beneath, round the head, of a deeper shade.

Anterior wings with a faint, narrow, transverse band, seldom completely defined, but most clearly seen on the costal margin, and consisting of two dark lines, the inner one straight, the outer one diverging from the inner as it approaches the costa, where it is bent sharply inward towards the base of the wing. Space between the lines scarcely darker than the rest of the wing, and about half the width of the terminal space; fringes with faint traces of dark scales at the end of the nervules. Secondaries immaculate.

Beneath, same as above in color, but the primaries have a more decided reddish tinge, and the basal half of the wings, as far as the outer line above, is uniform reddish brown.

♀. Reddish brown above and beneath; primaries above sprinkled with pale scales. Band of primaries more distinct, rather broader, and rather darker than the rest of the wing. Fringes paler.

Expanse of wings, ♂ 1.00 to 1.10 inches. ♀ 1.40 inches; *length of body* ♂ 0.50. ♀ 0.55 inch.

Habitat. Mountainous districts round the bay of San Francisco.

This species is abundant on the black oak (*Quercus Sonomensis*), the larva being full fed about the middle of May. Mr. H. Edwards has raised the species frequently, and it appears to be more constant in its coloration than *C. californica*, which varies quite as much as *C. neustria*, and to be at the same time confined to the mountainous regions where *Q. Sonomensis* is common. It has never been found, so far as I know, close to San Francisco, although *Quercus agrifolia*, the food plant of *C. californica*, is common in that vicinity, from which we may conclude that its range of food is limited, more so indeed than that of the latter species.

C. STRIGOSA. n. s.

♂. Entire insect dark cream color, with a tinge of yellow ochre.

Anterior wings with a moderately wide band, concolorous with the rest of the wing, defined by two rusty lines, straight, somewhat wider apart on the costa than on the inner margin, and both strongly bent towards the base of the wing on the costa. Terminal space about one and a half times the width of the band. Fringes of both wings distinctly interrupted with rusty scales at the nervules.

Beneath, the primaries are suffused with pale rusty scales, and all the wings are crossed by a distinct sinuous reddish brown line, that on the primaries corresponding to the outer dark line above. ♀ unknown.

Expanse of wings ♂. 1.25 inches; *length of body* 0.60 inch.

Habitat. Yosemite Valley, California. Hy. Edwards.

This may possibly be a variety of *C. constricta*, but I have given it here as specifically distinct because there is no difficulty in separating the imagines, though they resemble each other closely. The question cannot be considered settled, however, until we know the transformations of this species. It differs from *constricta* in the tint of the wings, which is unimportant perhaps, but constant so far as we know (5 ♂ of each examined); also in the proportionate width of the band and terminal space, but chiefly by its uniformly larger size and different coloration beneath.

C. EROSA. n. s.

♀. Entire insect pale, lustrous chestnut brown, with a tinge of ochre on the primaries and thorax. Secondaries rather darker than primaries.

Anterior wings crossed by two very oblique, nearly parallel darker lines; the inner one straight; the outer one somewhat bent towards the base of the wing as it approaches the inner margin. The space enclosed by these lines is wider than the terminal area. Fringes of all the wings dark, same color as the transverse lines. Outer margin of primaries distinctly concave at termination of 4th median nervule.

Beneath, uniform pale lustrous red-brown, fringes darker. The outer line on the primaries above faintly visible.

♂. Similar to ♀ but smaller.

Expanse of wings ♂ 0.95, ♀ 1.40 inches; *Length of body* ♂ 0.40, ♀ 0.65 inch.

1 ♂ 4 ♀ examined. Collected by Mr. Henry Edwards in Oregon. These were raised from larvæ which had been feeding on *Robinia pseudo-acacia*, and which had spun up in a number of leaves drawn together. The larva is yet unknown, but the male of this species is abundantly distinct from the male of *C. distria*, the only species with which it could be confounded.

In addition to the foregoing five species, all of which are undoubtedly specifically distinct, if we except *C. strigosa*, I have before me two other unique specimens which cannot be referred to any of the species herein described. That one of them is specifically distinct, is more than probable from the fact that I am acquainted with a willow-feeding larva belonging to this genus, which is found in California and is different from any species of which the transformations have been recorded, but which appears to be very difficult to raise, and from which I have hitherto been unable to rear the imago. One of these specimens I describe below, under the name of *C. thoracica*; while the other, being less strongly marked, is retained for future determination. I have also presumptive evidence, founded on dead larvæ, taken from aborted cocoons found in Oregon, of the occurrence of another species, the transformations of which still await elucidation.

C. THORACICA, n. s. (?)

♂.—Entire insect dull red-brown, the primaries rather redder than the secondaries, which are the same color as all the wings beneath. Primaries with exceedingly faint traces of a broad band. Head, thorax and abdomen rather grayer than primaries. Thorax very stout and very hairy, being disproportionately large; abdomen very short and conical.

Expanse of wings 0.90 inch; *Length of body* 0.40 inch.

Habitat: Congress Springs, San Mateo County, California. (H. Edwards.)

Differs widely from all our other species in the structure of thorax and abdomen, and probably belongs to the larva alluded to above.

C. AMERICANA, Harris, Ins. Inj. Veg., p. 267, (1841).

C. decipiens, Walker; *Phalœna castrensis*, Smith-Abbot.

Bombyx frutetorum, Boisduval, Ann., Soc. Ent. Belg., vol. 12, p. 82, (1868-9).

Habitat, Eastern States from Maine, (Packard) to Texas. (Belfrage). California (Boisduval).

Boisduval says of this species that "it is common in Canada and of infrequent occurrence in California." So far as I know it has never occurred on this coast.

C. DISSTRIA, Hübner.

Malacosoma disstria, Hübner, Verg. (teste Grote).

Phalœna neustria, Smith-Abbot; *C. sylvatica*, Harris.

Bombyx drupacearum, Boisduval, Ann. Soc. Ent. Belg., vol. 12 p. 72, (1868-9).

Habitat.—Atlantic States from Maine southward (Packard). California (Boisduval).

Boisduval says of this species "common over a large portion of the United States, much rarer in California." The occur-

rence of this species in California or even on the Pacific coast of North America is unknown to the writer, neither have I heard of a single complaint from the orchardists of this coast, which would lead to the suspicion that any species of *Clisiocampa* occurred in the orchards, or was likely to be a source of trouble. The occurrence of these last two species in California, as stated by Boisduval, I believe to be the result of errors on the part of his correspondents, though, from what we know of the distribution of other common Atlantic forms, it is quite possible that one or both may occur in British Columbia and Washington Territory, or even as far south as Oregon.

ON SOME SPECIES OF NISONIADES.

By J. A. Lintner.

Mr. Wm. H. Edwards has submitted to me for examination some examples of Nisoniades, which prove to be undescribed species. They are the following:

Nisoniades Nævius, n. sp.

Size somewhat less than *N. Juvenalis*, and *N. funeralis*. Wings fuscous, almost black, with a purple reflection.

Primaries with four minute, subquadrangular, white, costo-apical, hyaline spots, of which the fourth (from costa) may be obsolete; a similar spot in cell 3, and none in the discal cell. An irregular umber-brown spot centres on the discal cross-vein, and at about the middle of cell 1 b (the submedian interspace) is another, showing more distinctly in the ♀. The subterminal row of obscure, rounded, intranervuler fuscous spots rest on a dark umber-brown ground. All the markings are nearly lost in the dark ground; those best defined are two confluent trapezoidal spots in cell 1 b, forming the inner termination of the transverse row of spots, and defined without and within by a W in umber-brown. The spots of the transverse row are not of the ordinary sagittate form.

Secondaries dark brown, showing faintly the two rows of intranervular paler brown spots, more distinct in the ♀. Cilia dark brown, lighter upon their outer half in one ♂, and quite pale, approaching whitish in the ♀

Beneath, paler brown, and showing more or less distinctly the two ordinary lines toward the margin of pale brown spots, and in one ♂ example, a white spot in the discal cell, not seen on the upper surface. Head and palpi concolorous with the thorax abdomen and legs.

Expanse of wings: ♂, 1.45 to 1.65 in.; ♀, 1.65 to 1.70 in.

Described from 3 ♂'s, collected at Indian River, Florida.

This species is allied to *N. funeralis* Scudd.-Burg. Its markings are similar in form and arrangement and nearly as incon-

spicuous, and the pale fringe of the secondaries in one example shows a tendency toward the white fringe of that species. Its wings are not quite as pointed. The examples before me show none of the bluish hairs which sprinkle the primaries of *N. funeralis* and are still more numerous in *N. Juvenalis* Fabr. and *N. Propertius* Scudd.-Burg.

This may possibly be the *N. Terentius* of Scudd.-Burg., based upon the genital armature; but as the differences presented between the genitalia of this species, which have been carefully observed, and those of *N. Terentius* as described and illustrated, are greater than those which have served to separate other of the genitalic species, it would not be proper to accept the two as identical.

NISONIADES PETRONIUS, n. sp.

In ornamentation and general character, allied to *N. Propertius* Scudd.-Burg., resembling it in the quite oblique line of subsagittate black spots crossing the nervules. The black ma kings of the wings are more strongly contrasted with the dark brown ground than in *N. funeralis* or *N. Nœvius*, but less so than in *N. Propertius* and *N. Juvenalis*—about equal to *N. Persius*. The white hyaline spots of the primaries are of medium size—smaller than in the average of *N. Juvenalis*; that in the discal cell is small; that in cell 3 on the transverse line of sagittate spots is crescentic, concave toward the base; below the latter, in cell 2, a smaller white spot, wanting in one example.

Beneath, reddish-brown, especially the secondaries, which show two rows of pale brown submarginal spots which become obsolete before reaching the front margin of the wing, and wholly want the white spots in cells 6 and 7 which characterize *N. Juvenalis* * and *N. Propertius*. The white spots of the primaries are larger than above.

Head: above the eyes and just behind the "locklet" are a few white scales; behind and beneath the eyes are some pale yellow-brown scales, and similar colored hairs compose most of the palpal covering, quite in contrast with the dark brown color of the legs, thorax and abdomen.

A single ♀, accompanying the examples submitted to me, I refer, somewhat doubtfully to this species, from general markings and the pale-colored palpi. The transverse row of ellipsoidal black spots, and those of the medial and basal regions, are conspicuously outlined on a somewhat pale umber-brown ground—the contrast about that presented in *N. Martialis* ♀. An oval white spot in cell 2 accompanies the round one in cell 3. The costo-apical white spot in cell 9 is wanting.

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* In 45 examples of *N. Juvenalis* before me, these white spots are a prominent feature. In one example, the spot's each occupy the entire breadth of the cell.

Expanse of wings: ♂, 1.90 to 2 in.; ?♀, 1.80 in.

Described from 4 ♂'s and 1 ♀ from Indian River, Florida.

This is the largest species known to us in the genus. It is separable from *N. Juvenalis* and *N. Propertius* by its darker color, less distinct ornamentation, less rounded wings, and absence of the white spots of secondaries in cells 6 and 7. From *N. Nœvius* with which it is associated, it is distinguished by its large size, more distinct markings, and the contrasting lighter shade of the palpi.

The genitalia of this species resemble those given for *N. Horatius* and *N. Virgilius*, named from their genital armature, by Scudder and Burgess, but I am unable to refer it to either. Examples from Florida, which Mr. Scudder has kindly permitted me to examine, and labeled by him as *N. Horatius*, have the white hyaline spots of the primaries larger than in the above species, and, according to notes made at the time of their examination, "larger than in any of the *N. Juvenalis* in my collection, except in a single example taken at Center, in which they are about the same in size and similar in form."

NISONIADES PROPERTIUS, Scudd.-Burg.

Several years ago, through the kindness of Mr. Scudder, I was permitted to examine the species of the Nisoniades in his collection, including several of his types. Among them were eight examples, bearing his label of *Propertius*, from the following localities; two from Mokiah Pass, Palmer collection; one from Sierra Nevada; four from California; one from Juniper Mountains.

The following notes upon this species were made by me at the time, upon comparison of the material with the examples of *N. Juvenals* in my own collection.

Size of *N. Juvenalis;* the primaries more pointed; the submarginal row of sagittate and black spots is more oblique, being more drawn inwardly toward the base as it approaches the internal margin, whence it follows that, while in *Juvenalis*, of the two subelliptical whitish spots in cell 1 b, the lower one is as near to the outer margin as that in cell 3; in this species it is always further removed. The hyaline spot in the discal cell is smaller than in *N. Juvenalis* and is much less conspicuous underneath. Of the four costo-apical hyaline spots, 1, 3 and 4 are in line, or 3 is somewhat nearer to the base of the wing; 2 is nearer the apex and is elongated. The thorax and abdomen are fuscous, instead of umber-brown. In general color it is darker, more approaching *N. Persius*—the black spots not offering so strong a contrast with the ground as in *N. Juvenalis;* the primaries are nearly covered with bluish hairs, which is perhaps the best characteristic feature of the species.

It is very doubtful if the genitalic form, *N. Tibullus* of Scudd.-Burg., can be separated from *N. Propertius.*

This species has also been received from Utah and Arizona. I have also in my collection, examples received from Mr. Henry Edwards (No. 76), from Havilah, California, and Vancouver Island in the Middle and Eastern States.

NISONIADES ICELUS, Lintn.

Mr. W. H. Edwards has allowed me to examine two examples of this species, which he had obtained from the Western collections of Mr. Morrison in 1880, taken in Washington Territory. This extreme western locality for this insect is an interesting addition to our knowledge of its distribution. Mr. Scudder, in his *Systematic Revision of American Butterflies* (1872), gives as its distribution, Canada to West Virginia; Atlantic Coast to Michigan. In the Edwards' *Catalogue of the Diurnals of North America* (1877), its habitat is given as New England, Middle States and Illinois. Subsequently (my *Entomolog. Contrib.*, No. IV., 1878), I identified it among some Colorado collections of Mr. Morrison. These western examples do not differ in size or in any particular feature from our eastern forms. The examples before me are without date of collection. They are in fresh condition, and are rather more strongly marked with white scales toward the costal and outer margins of the primaries than those ordinarily met with.

An interesting feature of this species, observed by Dr. Speyer, is noticed in his valuable paper on the *Genera of the Hesperidæ of the European Faunal-Region* (Canad. Entomol., x. p. 169). It is the presence of a long and thick tuft of hairs on the posterior tibiæ. This is not found in *N. Brizo* Boisd.-Lec.—a species so closely allied to *N. Icelus*, that some writers have questioned their specific difference. It has been observed in but one other species of Nisoniades, viz., *N. Persius* Scudd. It also characterizes the Hesperidean genus Daimia of Murray, of which the European *D. Tethys* Men. is the type and sole species, and Scelothrix of Ramb.—united with Pyrgus H. by Dr. Speyer in his last Revision of the European Hesperidæ (1878), as Group 11, having *maculatus* Brem. as the type of the group. This tuft or hair-pencil differs in the several species. In *N. Icelus* it is produced from the femoral joint of the tibia, and is widely spread apart in the examples before me. In length it exceeds the tibia by nearly one-half. Like the costal-fold, it is probably confined to the ♂ sex.

A revision of the proof of this paper has enabled me to add the following: Since the above was written, an examination of the Nisoniades in my collection has shown the presence of the tibial hair-pencil also in the males of *N. funeralis* Boisd., *N. Nævius* Lintn., and *N. Lucilius* Lintn. I cannot detect it in any other than the above mentioned five species. In the genus Pyrgus, I find it

in *P. centaureæ* Ramb., *P. scriptura* Boisd., *P. Xanthus* Edw., *P. Petreius* Edw., and *P. ericetorum* Boisd. It is not present in *P. tessellata* Scudd. Of *P. Oceanus* Edw., *P. Ricara* Edw., *P. Philetas* Edw., and *P. cæspitabis** Boisd., I possess no examples for examination. It exists also in *Achlyodes Thraso* Hübn.

NISONIADES SOMNUS, n. sp.

Belongs to the *N. Icelus* and *N. Brizo* group; size of the former—its wings somewhat narrower and more extended apically.

Male, dark brown in color, approaching *N. Persius*. Primaries, without the anteapical white spot above, and the large patch of bluish-white scales resting on the discal cross-vein of *N. Icelus*. The black transverse bands are of the position and character of those of *N. Icelus*, but are almost lost in the ground color. Secondaries, nearly as dark as the primaries, showing indistinctly the two rows of pale brown spots.

Beneath, wings bronze by reflection. The primaries have a short costo-apical white streak in cell 8 and a minute white dot in cell 9 (*N. Icelus* has usually a subquadrangular white spot in cells 6, 7 and 8 each, and occasionally the spots form a continuous line nearly across the wing, from 2 to 8 inclusive); an intranervular series of pale streaks, and on the secondaries, the two rows of yellow-brown spots are distinct.

Female, paler brown than the male. The two transverse bands of the primaries are quite distinct, and between them, on the discal cross-vein, is a conspicuous patch of whitish scales; no white anteapical spots; upon the margin, a row of rounded brown spots, separated from the contiguous band, by whitish scales. The bands are broader than in *N. Icelus*, and are almost drawn together on vein 2; the connected series of spots composing each, are shaped much as in *N. Icelus*, are heavily bordered with black, and bear bluish scales. Secondaries, with a geminate discal mark, a submarginal row of yellowish spots much bent inwardly opposite the cell, and a marginal row of small, linear, whitish spots.

Beneath, wings with a strong bronze reflection. The secondaries have the two rows of spots of the upper surface repeated; the primaries have a marginal row of linear whitish spots, a regularly curved submarginal row of eight oblong yellowish spots, and a single white anteapical spot in cell 8.

The antennæ, in this species, are delicately annulated with white. The palpi are shorter than in *N. Icelus*, shaggy, some of the hairs of the second joint extending to the tip of the third. The tibiæ of the posterior pair of legs are without the pencil of hairs characterizing *N. Icelus*.

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* Erroneously given as Cæspitatis in Edwards' Catalogue.

The last mentioned feature, separates beyond question, this species from *N. Icelus*. It may also be distinguished by the darker and more uniform color of the male, the transverse bands hardly separable from the ground color, the absence of an ante-apical white spot and of the discal patch of bluish scales. The female resembles *N. Brizo*, but the inner margin of the outer band is much more irregular than in that species, and the submarginal row of spots on the primaries beneath, takes the place in prominence, of a different series seen in *N. Brizo*, of which only the costal one is here represented.

Expanse of wings: ♂, 1.30 inch; ♀, 1.45 inch.

Described from 1 ♂ and 1 ♀, in the collection of Mr. W. H. Edwards, received from Indian River, Florida.

The relationship of this species, suggests the mythological name given it. BRIZO was worshipped as the goddess of sleep. ICELUS was regarded as the inspirer of dreams in mortals, and was the son of SOMNUS, the god of sleep (See 23 *Rept. N. Y. St. Mus. Nat. Hist.*, 1873, p. 163-4).

EUDAMUS PROTEUS (Linn).

Quite an interesting addition to the list of Hesperidæ, occurring in the State of New York, is the above species.

Two examples of it, one of which I have been permitted to see, were captured by Mr. S. Lowell Elliot, of New York City, about the middle of August of last year, in the Central Park Gardens, east of the Mt. St. Vincent Art Gallery, upon the flowers of *Salvia splendens*. Other examples of it, as Mr. Elliot informs me, were seen by him, which he was unable to capture, for as soon as they alighted they were attacked by *Eudamus Tityrus*, which swarmed around these flowers and seemed to recognize the *Proteus* as strangers and intruders.

The species was not observed about other flowers, but were seen hovering around the *Salvia* for three consecutive days, when a cold rain storm ensuing and continuing for several days, terminated their visits.

Scudder reports the species from "Eastern N. America, as far north as Connecticut," but we have not been able to verify its collection in that State. We believe that these are its first captures within the State of New York.

EUDAMUS NEVADA, Scudd.

From an example received from Mr. Henry Edwards, No. 2509, Summit Sier. Nev., Cal., and from an additional example collected by Mr. Nash, of Ithaca, in Colorado, I find that the above form is a valid species, quite easily to be separated from *E. Pylades*, of which, at the time of the publication of the Edwards' *Catalogue of the Lepidoptera of America-Diurnals*, it was believed to be a dwarfed variety.

NEW WESTERN MOTHS.

By A. R. Grote, A. M.

Thyatira Lorata, n. s.

Forewings ashen brown, shaded with white over median space, superiorly and about a deep brown triangular shaded blotch, which marks the inception on costa of the subterminal line. A basal white median patch, edged with black and stained with pink. Median lines distinct, black, single, approximate, approaching inferiorly; t. p. line followed by black venular marks. Stigmata small, near together; reniform upright, subovate: orbicular, round. A reddish patch at internal angle, edged within with white. A narrow waved apical streak. Hind-wings yellowish fuscous, with sinuate mesial shade and reddish fringes. Thorax light brown; sides of tegulæ whitish; beneath dull yellowish fuscous with double sinuate shade bands emanating from two costal dark brown or blackish marks on fore-wings. Head and collar deep brown.

Expanse 40 mil. Washington Ter., coll. Mr. B. Neumoegen.

At once distinguished from our Eastern *Pudens* by the broader primaries, with their black propinquitous median lines, the absence of the apical patch and the subterminal dark costal blotch, while the costal region at base is equally dark, the stigmata complete; the reniform a little reddish; the basal patch is notched superiorly and less extended than in *Pudens*.

Bombycia Semicircularis, n. s.

♀. Eyes naked; head sunken; a tuft on the third abdominal segment; wings broad. Primaries with a basal creamy patch; black edged, pointed on the s. m. fold. Beyond is a broad transverse anterior shaded band, made up of three or four black lines with the spaces between them black-shaded. The ground color of the wing is hoary gray. A second vague black band, made up of two or three lines, crosses the wing beyond the disc and approaches the first on submedian fold. Median space dark gray; stigmata approximate, not very noticeable, concolorous, the reniform with blackish centre; the orbicular reduced, round. A black festooned line below apices inaugurates the s. t. line, somewhat as in *Thyatira Lorata*, but the first curve is obsolete, the line appearing along external margin below the tip; it is discontinued below vein 6. Hind wings yellowish gray, with an inner broad and diffuse band, beyond which the wing is narrowly paler before an indistict outer line. Beneath yellowish gray with double bands, the inner very broad; tegulæ whitish with brown tips; head and collar dark.

Expanse 40 mil. Washington Territory, Coll. Mr. B. Neumoegen.

This specimen is more sombre than *B. Improvisa*, Hy. Edw., and wants the yellowish green patches and rosy markings.

In *Semicircularis* the anterior black band is nearly evenly arcuate, it is waved in *improvisa*, and notably drawn in at submedian fold. There is a black dot on the cell near the t. a. line, marking the orbicular in *improvisa*, wanting in *semicircularis*. The apical streak is more continuous and waved in *semicircularis*. The basal patch is extended to the internal margin in *improvisa*, but in *semicircularis* it is confined to the middle of the wing much as in *Thyatira*.

NOLA FUSCULA, n. s.

♂ Allied to *Minuscula*. Antennæ bipectinate. Gray. Head and collar whitish, the latter with a fine black line. Primaries fuscous gray; median space darker shaded before the t. p. line. Inner line black, fine, roundedly produced at median vein. Outer line preceded by a faint coincident line; the t. p. line itself is roundedly produced opposite the cell, running inwardly below median vein, thence arcuate to internal margin. S. t. line indicated by a diffuse dark shade. Hind wings soiled whitish. *Expanse*, 25 mil. Colorado. This species is larger than *Minuscula*, from Texas, which it otherwise much resembles. The forewings are darker, the hind wings paler.

AGROTIS HAVILÆ, Gr. B. U. S. G. S., vi., 157.

A number of specimens collected by Mr. Morrison in Southern California leave no doubt on my mind that the species is distinct from our Eastern *Clandestina*. The general color is paler. The head and thorax more decidedly brown; the t. p. line is followed by whitish points, the line itself more strongly dentate; the hind wings are more uniformly fuscous. In fresh specimens the paler marks forming the t. p. line, and the edges of the stigmata and t. a. line have a whitish cast.

AGROTIS CLODIANA, n. s.

♂ All the tibiæ spinose; fore tibiæ with longer terminal spines. Eyes naked. Antennæ brush-like. Allied to *Gravis*, but without the distinct stigmata. Forewings of a curious purplish brown, with a shading of yellowish. Orbicular small concolorous, round, with a paler yellowish annulus; reniform concolorous, transverse, moderate, ringed like the orbicular. Claviform indicated, small median shade, blackish, diffuse. Lines illegible; fringes with a narrow, pale yellowish line at base. Hind wings pale, soiled with fuscous along the margins. Head and color russet brown, collar with a pale line above a deeper shade; thorax mixed pale and brown. Beneath fore wings dark; hind wings pale, with discal marks and faint common line. *Expanse*, 38 mil. Washington Territory.

A female specimen, also collected by Mr. Morrison, probably belongs here. The fore wings are entirely obscure yellowish brown, with the markings lost.

HADENA CINEFACTA. n. s.

♀. Eyes naked; tibiæ unarmed. Abdomen with a series of small abdominal tufts. Gray over ochrey or olive fuscous. The species has a resemblance to *Mamestra Distincta*, but differs generally by the naked eyes. T. a. line much projected outwardly below median vein; claviform pale, outlined in black, its inferior margin a black streak in sub-median fold connecting the two lines. A fine black basal ray. Orbicular outwardly oblique, pale, moderate; reniform upright, nearly concolorous. Median space tinged with olive ochrey; basal and sub-terminal fields gray; terminal space olive fuscous. The M-mark of sub-terminal line is well written, preceded by three cuneiform dark marks before the s. t. line itself. Fringes dark, cut with pale opposite the veins. Hind wings fuscous. Thorax gray, with olive fuscous lines on collar and tegulae. Beneath the wings are grayish fuscous with faint common line and obscure discal dots on secondaries. *Expanse* 35 mil.

Washington Territory. Coll. Mr. B. Neumoegen and Mr. Hy. Edwards.

MELICLEPTRIA HONESTA. n. s.

Allied to *Oregonica*. Fore wings with the basal field, the stigmata and the sub-terminal space dark olive, somewhat golden sericeous. Median field light yellow, narrow, the yellow color obtaining narrowly between and about the spots and obtaining inferiorly except along the t. a. line which is followed by an olive shade below the median vein. Sub-terminal line pale yellow, narrow, twice indented. Hind wings black with the discal lunule absorbed by the basal field and its lower end intruding on a mesial white band; the black border shows an oblique series of small pale spots between the median nervules. Beneath, grayish white; on fore wings the stigmata, sub-terminal space and a basal streak along internal margin black; on the hind wings the border is black about anal angle and the discal lunule is tinged with black. *Expanse* 23 mil.

Mount Hood. Oreg. Coll. Mr. B. Neumoegen.

TRIOCNEMIS. n. g.

A noctuid genus from south California allied to *Heliothis* and *Chariclea*, differing by the flattened fore tibiæ which have a broad, rounded exterior projection, a very long stout spine near the inner margin, and a short spine at the extremity of the inner edge. Eyes naked; ♂ antennæ simple. Thorax with discolorous posterior tuft. Abdomen untufted.

TRIOCNEMIS SAPORIS. n. s.

White: Head and thorax white, with a brownish tuft behind on the thorax. Band of forewings white, bounded by the t. a. line, which makes a sharp sub-median projection and a slight notch on s. c. vein. Median space blackish; the stigmata indicated by white inner ringlets or anterior shades. T. p. line much

exserted superiorly, running in opposite the dentation of the t. a. line. S. t. space narrow, white, with a black costal shade and some cuneiform marks at the middle. Terminal space, and fringes leaden gray; terminal line a succession of white streaks. Hind wings fuscous, paler within a narrow median white band. Beneath, with markings reflected. *Expanse 27* mil.

Washington Ter. Coll. Mr. Hy. Edwards and Mr. B. Neumoegen.

DESCRIPTION OF A NEW HESPERIAN FROM FLORIDA.

By W. H. Edwards.

PAMPHILA STRATON.

Male.—Expands 1.5 inch.

Upper side dark brown, marked and spotted with reddish fulvous; three small spots in subcostal interspaces of primaries, two others opposite cell and towards hind margin; and in line with these an oblique row crossing the median interspaces, the lower spots merged in the fulvous of disk which extends to base and anteriorly to costa; the stigma in two sections, the anterior one completely crossing the lower median interspace; a narrow smooth black slightly bent ridge; the lower one in sub-median interspace, parallel to the line of the other; short, not reaching either nervule; behind the stigma is a narrow blackish rough patch. Secondaries have the disk obscure fulvous, with an imperfectly defined series of spots on the anterior half of the wing; fringes of primaries fuscous next the margin, whitish outside; of secondaries fuscous next margin, then fulvous, and outside whitish.

Under side of secondaries bright ferruginous of one shade and immaculate; apex of primaries bright ferruginous; the hind margin a little obscured, the spots indistinctly repeated, next base and against stigma black.

Body above black, covered with fulvous hairs, thorax below yellowish, abdomen same with a fulvous tint; legs fulvous, palpi light yellow with fulvous tint; antennæ black above, yellowish below; club black on both upper and under surface, on the sides fulvous.

Female.—Expand 1.6 inch. Color dark brown; primaries have spots placed as in the male, distinctly defined throughout, the basal area being brown, instead of fulvous as in male. Secondaries as in male. Under side as in male, but on the disk of secondaries is an indistinct bent row of small paler spots corresponding to the spots of upper side.

From 3 ♂ 1 ♀ received from Indian River. The male is very like *Leonardus* on upper side, with the stigma of same peculiar character, and in this respect these two stand alone among

American species so far as known to me. So the clubs of the two are precisely alike. But on the under side there is a departure from *Leonardus*, which has distinct spots on secondaries. In color and lack of spots *Straton* resembles *Arpa*.

A NEW SPECIES OF ANTARCTIA FROM MOUNT HOOD, OREGON.

By B. Neumoegen.

Antarctia rubra. n. sp.

♂ Head and thorax remarkably pilose and of bright blood orange color. Head prominent, thorax very stout, abdomen of short, conical structure, less hairy, and of lighter color. Antennæ prominent, of same color as head and thorax, with black, even pectinations. Legs concolorous with thorax.

Primaries chocolate color with a reddish underground. Fringes orange color intermixed with brown. No special markings, except a small blackish discal spot, hardly perceptible.

Secondaries smoky black with orange tinted, bright fringes, and a diminutive black discal spot.

Beneath, primaries as well as secondaries reddish brown, fading into a lighter, whitish shade towards base, and fringes of a prominent reddish tint. Discal spots in primaries and secondaries, well marked in black.

♀.—Larger than male. Antennæ, palpi, head and thorax, less hairy and concolorous with primaries. Antennæ slender and smooth. Abdomen prominently formed, of yellow reddish shade.

Primaries of strikingly vivid color, being the true blood orange tint, with a somewhat darker, hardly noticeable discal spot. No other markings. Fringes of same color.

Secondaries of smoky black with blood orange fringes. A very small, black discal spot.

Beneath, primaries and secondaries orange-colored, fading towards base. The discal, blackish spots well marked in both wings. Fringes concolorous.

Expanse of wings, ♂ 1 1-10 inches; ♀ 1½ inches.

Length of bodies, ♂ ¼ inch; ♀ ⅜ inch.

Habitat: Mount Hood, Oregon.

Having convinced myself that I had not to deal with the red California variation of A. punctata, Pack., which, by the way, occurs only in the female form, I decided to study Boisduval's description of California Arctians, especially A. rufula, before pronouncing on the present species. I came to the conclusion that A. Rufula, Boisd., ♂ (vide Lepid. de la California, p. 80.) is nothing but one of the numerous varieties of A. vagans, Boisd.,

while the ♀ A. rufula is but the reddish form of A. punctata, Pack.

A. rubra, therefore, proves to be a beautiful addendum to the hitherto described species.

Collected by Mr. H. K. Morrison, season of 1880.

Types ♂ ♀, collection B. Neumoegen. The type of ♀ kindly presented to me by Mr. A. R. Grote.

A NEW GENUS AND SOME NEW FORMS OF NORTH AMERICAN ZYGÆNIDÆ.

By Hy. Edwards.

Penthetria. Hy. Edw. Nov. gen.

Similar to the Fabrician genus Procris, but differing in having the antennæ slender and non-pectinate in both sexes. The abdomen, too, is without the anal tuft in the female. The genus Procris, as originally indicated by Fabricius, included Ino. *Leach* and Aglaope. *Latr.*, and it is doubtful if we have any true representatives of either in the United States fauna, the species recognized by Harris under the name of Procris having been, by common consent, placed in Acoloithus and other genera.

Penthetria Majuscula. Hy. Edw. n. sp.

♂. Greenish black throughout, with a metallic lustre, wanting along the costal edge of secondaries. Abdomen with the anal segment golden yellow.

Exp. wings, 0.90 inch. Georgia. H. K. Morrison. Type. Coll. Hy. Edwards.

♀. Similar to the ♂, but a trifle larger and with the anal seggent of the abdomen concolorous with the rest of the body. Type. Coll. F. Tepper.

Penthetria Parvula. Hy. Edw. n. sp.

Primaries smoky black, with purplish reflections, rather darker about the margins. Secondaries smoky, semi-transparent. Thorax, abdomen, legs, and antennæ concolorous. Under side similar to the upper.

Exp. wings, 0.60 inch.

1 ♂. Indian River, Florida.

1 ♀. Georgia.

Types. Coll. Hy. Edwards. F. Tepper.

Gnophæla vermiculata. G. & R.

n. var. Continua. Hy. Ed.

A form of *G. vermiculata*, probably common, in which the cuneiform whitish patches of the primaries and the sub-marginal spots are joined together, the whole central portion of the wing being thus sub-diaphanous, exeept a large costal patch behind the cell. In the typical form, a broad band of black crosses the wing, clearly dividing the whitish spaces.

2 ♀. Colorado.

Type. Coll. Hy. Edwards.

LYCOMORPHA CONSTANS. Hy. Edw. n. sp.

Smaller than *L. pholus*. Primaries bright orange, with narrow marginal border of black, widest at the apex. Secondaries black, with narrow costal margin of orange. Antennæ black. Thorax black on the disc, the outer margin orange. Abdomen black. Tibiæ whitish. Tarsi black.

Exp. wings 0.70.

Prescott, Ariz. W. Howard.

Type. Coll. Hy. Edwards.

At once distinguishable from *L. pholus* by the narrow margin of the primaries and the almost wholly black secondaries.

LYCOMORPHA DESERTUS. Hy. Edw., n. sp.

♂. Closely resembling *L. pholus*, but with the black margin of the primaries narrower, though not so narrow as in the preceding sp. It is broadest on the apex, and its inner edge is oblique as in *L. pholus*, while in *L. constans* it is rounded inwardly. The black margin of secondaries is also narrower than in *L. pholu*, and does not curve upwards to the base along the anal margin as in that species. The larger portion of the wing is thus orange. Abdomen, antennæ and tarsi black. Palpi and base of tibiæ orange.

Exp. wings. 0.75 inch.

♀. Much larger than the ♂, with the primaries orange, a broad, black transverse band crossing them near the base and another from costa to the termination of the internal margin, thus leaving the apex orange. Secondaries as in the ♂. Thorax and abdomen orange, above and below. Tibiæ and tarsi orange. Antennæ blackish, paler at their base.

Exp. wings. 1.25 inch.

Underside, the same as the upper, in both sexes.

1 ♂. 1 ♀. Tucson, Arizona. W. S. Edwards.

Types. Coll. Hy. Edwards.

The examples of this singular species reached me in copulation, or they would have suggested different species, if not distinct genera. They, as well as the previous species, seem to exhibit the richness of the insect fauna of the little known region from whence they come.

NOTES ON THE LARVÆ OF SOME MOTHS.

BY G. H. FRENCH, CARBONDALE, ILL.

ARCTIA DECORATA, Saund.

On page 182 of the 7th Illinois State Entomologist's report, I gave a brief description of the larva of this moth under the name of *Arctia Phalerata*, Harr. I had reared several specimens,

all of the imagines having the prevailing black color of both primaries and secondaries of *Decorata*, with the red in the secondaries peculiar to that form, but at that time I regarded it as only a variety of *Nais* or *Phalerata* of Harris, and for that reason put it in the report in that form. Since that time I have bred several others. and finding the markings of the imagines to be rather constant, I think the description, brief though it may be, should be credited to *Decorata* instead of *Nais*. In this I do not wish to decide whether *Decorata* is a good species or only a variety, but leave that for future investigation. In either case the larvæ will probably be found to differ. I shall endeavor to make more extended observations on them this season. The description referred to is: "A black, hairy caterpillar an inch or more long, with transverse rows of wart-like tubercles, from which spring spreading tufts of short white hairs. Along the dorsum is a line of pale yellow, sometimes almost white." Like the other Arctians it is a very general feeder.

CYMATOPHORA PAMPINARIA, Guenee.

In his book on Geometrid moths Dr. Packard gives the color of the larva of this as "pale yellowish color, with a broad reddish brown stripe, edged with black on the back." Last fall I found several of them. Some were of the yellowish green color above, others gray and others brown. Packard speaks of pear leaves being their food. I found them feeding on willows and cultivated geraniums. Two of them pupated September 16th and October 2d. Both of these hatched April 17th of this year.

NOTICE TO SUBSCRIBERS.

It was the intention of the Publication Committee to issue Mr. W. H. Edwards' paper on Pieridæ for the present number, but the plates for illustration have not yet arrived from London, and the article in question must therefore be delayed until June.

ERRATA.—On page 43, April No., line 15, for grayish, read yellow; line 5, for Perdiceas, read Perdiccas; page 44, line 8, for Perdiceas, read Perdiccas.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] June, 1881. [No. 6.

ON PIERIS BRYONIÆ OCHSENHEIMER, AND ITS DERIVATIVE FORMS IN EUROPE AND AMERICA.

By W. H. Edwards.

The species, of which *Bryoniæ* is one of the forms, is known as *Napi*, Linn, and is seasonally polymorphic, having in Europe three manifestations, *Bryoniæ*, *Napi* and *Napææ*. The last of these was until recently regarded as a distinct species, or possible species. Westwood, in 1848, is uncertain of the position of *Napææ* Esper, but thinks it is probably a variety of *Napi*, and remarks that "neither caterpillar nor chrysalis have been observed, nor have any circumstances connected with the time or place of its appearance been given," and quotes Stephens as saying: "I think with Godart that it may only be a very large variety of *Napi*, but as it appears to have characters sufficient to constitute a distinct species, the determination of this point must be left for future investigation." Brit. But., Humphreys-Westwood, *Napi*. Boisduval, however, Spec. Gen. I, 518, 1836, had given the species as: *Napi* Linn.; "common throughout Europe and Siberia during summer."

Var. A. *Napææ*, "Common in the autumn."

Var. B. *Bryoniæ*, "Alps" &c.

Dr. Aug. Weismann, in his Studien zur Descendenz Theorie, part 1, Leipzig, 1875, gives excellent colored figures of these three forms in both sexes, and the plate is repeated in the English translation, "Studies in the Theory of Descent," London, 1880. In the text, Lond. ed., page 39, Dr. Weismann says of *Bryoniæ:* "This is, to a certain extent, the potential winter form of *Napi*. The male exactly resembles the ordinary winter form (*i. e.*, *Napi*, Esper) in the most minute detail, but the female is distinguished from *Napi* by a sprinkling of grayish-brown scales

over the whole of the upper side of the wings. This type, *Bryoniæ*, occurs in polar regions as the only form of *Napi*, and is also found in the higher Alps, where it flies in secluded meadows as the only form, but in other localities less isolated it is mixed with the ordinary form of the species. In both regions *Bryoniæ* produces but one generation a year, and must then, according to my theory, be regarded as the parent form of *Napi*." On page 44; "In the Alps and Jura, the ordinary form of *Napi* swarms everywhere from the plains towards the habitat of *Bryoniæ*, so that a crossing of the two forms may occasionally or even frequently take place; and it is not astonishing if in some places, Meiringen for example, a perfect series of intermediate forms between *Napi* and *Bryoniæ* is met with. That crossing is the cause of the great variability of *Bryoniæ* in the Alpine districts is proved by the fact that in the Polar regions this form 'is by no means so variable as in the Alps, but judging by about 40 to 50 Norwegian specimens, is rather constant. My friend, Dr. Staudinger, who has twice spent the summer in Lapland, thus writes in reply to my question. A crossing with *Napi* cannot there take place, as this form is never met with, so that the ancient parent-form *Bryoniæ* has been able to preserve its original constancy."

Dr. Weismann, page 40, relates how he obtained eggs from a female *Bryoniæ* in June in a secluded Alpine valley, and subjected the pupae therefrom to a high temperature in a hot-house, but only one butterfly emerged the same summer, in spite of this high temperature, and of what he regards as of more special importance, in spite of the want of cooling at night, and that this was a male *Bryoniæ*. "The other pupae hibernated in the heated rooms, and produced from the end of January to the beginning of June, 28 butterflies, all of which were exquisite *Bryoniæ*. Experiment thus confirmed the view that *Bryoniæ* is the parent form of *Napi*, and the description hitherto given by systematists ought therefore properly to be reversed. Pieris *Bryoniæ* should be elevated to the rank of a species, and the ordinary winter and summer forms should be designated as vars. *Napi* and *Napææ*."

Boisduval describes *Napi* (*i. e.*, the ordinary winter form) thus: "Wings white, with the base a little ash-colored. Primaries have the apex and ordinarily the extremities of the nervures black; the disk *sometimes without spots in the male, and sometimes with one black spot, as in Rapæ*; in the female *ordinarily two spots and a black stripe situated as in the female of Brassicæ and of Rapæ. Secondaries have a black spot on costal margin.* Under side of primaries white, with *two black spots as in the allied species*, the apex yellow; under side of secondaries of a pale yellow, with veins of blackish-green covering the nervures." Westwood says: "The males *generally have a black spot* between the middle and apex of the wing (primaries); the females have *two large black spots* towards the posterior margin, the *hinder one being connected*

with a black dash on the inner margin; on the under side the males have *two black spots* corresponding with those of the females."

Napææ, Westwood says, is of a larger size than the ordinary specimens of *Napi*, and, quoting from Stephens: "The male has the upper surface milk-white, with the tip, a spot, and two or three triangular dashes on the hind margin of the anterior wings black; *beneath two cinereous spots;* the posterior wings are pale yellowish, *with a deeper costal streak*, the basal nervule above (*i. e.*, towards costa) dilated and greenish. The female has the tip of the anterior wings *and three spots*, one of which is sub-triangular, and placed on the thinner edge of the wing (the inner margin) black or dusty, and the posterior wings are clearer yellow."

Boisduval says briefly (Spec. Gen. 1,519): "*Napææ*. A little larger than *Napi;* the under side of secondaries shows only some short dusky veins extending from base to end of cell, but only towards costal margin."

Humphreys-Westwood figure and describe a small form, *P. Sabellicæ*, thought by Stephens and others to be a distinct species, described as having the veins on each side strongly margined with brown, "dark margins of the veins both on upper and under surface," but they give reasons for regarding it as a variety of *Napi*. Boisduval, in Spec. Gen., says nothing of this form, and Staudinger's Catalogue makes no mention of it. So that it would seem to be an occasional aberration, and, from the description, resembles some of the American varieties. I only know this *Sabellicæ* from H.-W., and I find in the catalogues of Kirby and Staudinger no reference to any other named variety of *Napi*. Whether *Sabellicæ* is an offshoot of the winter or summer form is not said.

Dr. Weismann sent me 1 ♂ 3 ♀ labelled "summer generation, *Napææ*, taken 30 June." The females have a large pale black apical patch, *three large deep black spots beyond cell*, the upper one partly concealed by the paler apical patch, and on costa of secondaries is a *fourth black spot* nearly as conspicuous as either of the others. On the under side are *two large black spots* on fore wing corresponding to the lower two of upper side, the upper spot of that side not being repeated. *The spot on secondaries is repeated.* Under side of secondaries pale yellow, the nervures next base bordered with brown scales most heavily on the costal side. The male has the tip largely pale black, and but one spot on fore wing, another on costa of secondaries. Beneath, primaries have *two spots:* secondaries are pale yellow, with a *deeper yellow edging to costa from base to outer angle*. I have another male which *has two spots* on upper side of primaries and a *black dash along inner margin*. This also has the *yellow edging* spoken of.

These are therefore the three forms under which the species

manifests itself in Europe, *Bryoniæ*, *Napi*, *Napææ;* of which *Bryoniæ* may be considered the parent-form, true to its type in those regions where the climate allows of but one annual generation. But in some localities, as remarked by Dr. Weismann, it is intercrossed by *Napi*, and there must be localities where two generations find existence, made up of *Bryoniæ* and *Napi* more or less intercrossed. But generally, in districts not Arctic or Alpine, the species is represented only by *Napi*, which then is the first or winter generation and *Napææ*, the later or autumnal generation.

Now let us see how the corresponding American species agrees with the European, and wherein it has come to differ.

I. BRYONIÆ. *Bryoniae* of the Arctic and Alpine type is found in America. I have seen several examples from Behring Straits, Alaska, and as they are of one type, I conclude this must there be the only form of the species. The male is white, the bases of all wings much covered with black scales; so is the costa of primaries, especially against cell and base. The apex is usually more or less blackened, and sometimes the hind margin for half its course has black about the ends of the nervules. So have the ends of the nervules on secondaries. Sometimes there is a black spot in the upper median interspace of primaries. Beneath, the hind wings are either white or faintly yellow-tinted, and the nervures and their branches are all heavily bordered with gray-brown, more heavily than any Alpine *Bryoniæ* which I have seen; (Lapland examples I know only from description); the apex of primaries is often yellow and the nervures and branches edged with brown also, but much less than on secondaries.

The female has a much crocked upper surface, the gray sometimes covering primaries almost to the exclusion of white; on secondaries the nervures and branches are all heavily bordered with gray; of four examples before me, three have a black spot in upper median interspace, another in sub-median, and in two there is a third spot in line with these near costa. The inner margins of the three are also bordered with black. The fourth example has neither spots nor border; on the costal margin of secondaries is a black spot. The under side varies from pale to deep yellow, and the fore wings of the three show the black spots, but not very distinctly. (I find the same variability in these spots in *Bryoniæ* of Europe). The Alaskan examples are all small, expanding about 1.5 inch; one ♀ 1.6 inch.

From Newfoundland, Mr. Mead brought many *Bryoniae*, all of large size, expanding 2 to 2.2 inches. The male (of a pair sent me) is white, the female pale yellow on upper side; the female not so much crocked as some European examples, but very like others, the nervures of upper side not quite so much bordered with gray as in the Alaskan examples. On the under side, like these

last, the nervures and branches are all heavily bordered with dark gray-brown, much more than in any of my Alpine *Bryoniae*. Probably Lapland examples would show this same heavy veining. Mr. Mead writes: "The dark winter form (*Bryoniae*) was caught during the last week in July (in Southern Newfoundland), but nearly all were more or less battered, and many caterpillars were nearly full grown at that time." This would make the first appearance of the early butterflies about 1st July, or last week in June. From these caterpillars Mr. Mead obtained several chrysalids, about 50 per cent. of which gave imagos between 15th and 20th August, the duration of the pupa period in such cases being about two weeks. The remainder have over-wintered. I have received from Mr. Mead 1 ♂ 2 ♀ which so emerged in August. These are of as large size as the parent-form, the ♂ measuring 2.2 inch, the two females 2 inches. The females at first glance look like ♀ *Venosa*, and in the clouding and the spots of upper side come very close to a female from Vancouver's Island. They are yellow on both sides like that, but the apical patch is more continuous, and the nervures on upperside are not edged gray. Beneath, the nervures of primaries are scarcely more gray than specimens of *Oleracea æstiva*, the few scales that are present being on subcostal and median inside the cell; secondaries are moderately edged from base to end of cell, and on the nervures the scales diminish regularly to the margin.

The male is white as *Oleracea;* no black veins on upper side; a pale gray apex to primaries, and a little black at bases of wings. Below, light yellow, immaculate, the scales as in the females.

Now clearly this form is not *Venosa*. It is the summer generation in Newfoundland; *Venosa* the winter generation in its territory. But this is between *Venosa* and the summer form of same, *Pallida*. I call it ACADICA.

Evidently, in Newfoundland there is one annual generation and a partial second generation, and the existence of the species there must mainly depend on the early chrysalids which overwinter. A favorable long summer would allow the larvæ of the second brood to go to chrysalis, but a short or cold summer would not. And, as has been observed in the case of other species of butterflies in northern regions, nature has made provision against extinction by carrying part of the chrysalids of the early generation over to the next year. This partial second generation in Newfoundland has developed a form not seen on the main land, where we find the well-defined winter form, *Venosa*, and its equally well-defined summer generation, *Pallida*. *Acadica* lies between these two, and is yet a summer form.

Of the intervening country between Northern Alaska and British Columbia we know nothing, and therefore cannot say where *Bryoniæ* becomes digoneutic, and *Venosa* comes in. But in British Columbia and Vancouver's Island we know that *Bryoniæ*

has disappeared, and *Venosa*, which is the equivalent of *Napi*, is the winter form, succeeded by a summer form *Pallida*, and the species manifests itself mostly under these two forms to its southern limit on the Pacific Coast.

Except from Alaska and Newfoundland I know of no other *Bryoniæ* having been taken.

Pieris *Hulda* I consider a modification of *Bryoniæ*. When my Catalogue was published, 1877, I had not seen *Bryoniæ* from Alaska, and did not know that it existed on this continent, and I regarded *Hulda* as the extreme arctic type of *Bryoniæ* and its American representative. All the examples of *Hulda* known to me (about 25) came from Kodiak Island, and there is probably something in the climate or food or insulation which has tended to produce this dwarf form. Both sexes expand from 1.2 to 1.3 inch, but one female is 1.5 inch. The males are white on upper side, the apical nervules edged with gray. Beneath, both sexes are alike, the color varying from white to pale and deep yellow; *and all nervures and branches are so broadly edged with ashy-brown that very little of the ground is seen, only in stripes in middle of the interspaces.* I have seen no European *Bryoniæ* whose under surface is anything like so much obscured as these *Hulda*. Three females out of four have the *nerves of upper side bordered with same brown and in same manner as beneath*, the white ground being thereby reduced merely to lines and stripes, and these examples have no spots in the interspaces like the typical ♀ *Bryoniæ*. The fourth example is a little less obscured, and has a dusky spot in submedian interspace only, and the inner margin is bordered dusky, in these respects approaching *Bryoniæ*. As stated above, the fourth Alaskan *Bryoniæ* is without spots, and therein it approaches *Hulda*. I believe *Hulda* to be the first American departure from the European type of the species. At any rate, if this form is Asiatic, as it should be, if found at all in the old world, I have no information of it. It seems as yet to be strictly American.

2. VENOSA, Scudder. This form is described as having "the extremities of upper *nervures broadly margined with black scales, with a spot of same color in the upper median interspace, a black dot at the tips of the nervures on secondaries.* The female differs from the male in having nearly all the *nervures on upper side of primaries somewhat bordered with grayish scales, but most characteristically by the presence of a band of grayish scales along the posterior border of primaries. Beneath, as in the darker forms of Oleracea,*" (i. e. *hyemalis*). This describes one phase of *Venosa* ♂, and probably the prevailing one; but some males have no spot on primaries. I have seen no male *which had any spot on primaries beneath, or on costal margin of secondaries on either side*, points which are characteristic of *Napi* (or what Dr. Weismann calls "the ordinary winter form)." The *Venosa* ♂ which are immaculate above,

are nearest *Oleracea hyemalis* ♂, but the nervures are blacker in the former, and the costal margin of primaries is more extensively bordered black. *Venosa* ♀, so far as I know it, has a second spot not mentioned by Mr. Scudder, the one in sub-median interspace, as seen in *Napæ*. In this sex also my examples *show no spot beneath on either wing*, but all have a gray patch on upper side of secondaries on costa. A large percentage of female *Venosa are yellow on upper side*, another departure from the European type of *Napi*.

Comparing *Venosa* ♂ with European examples of *Napi* (winter form) sent me by Dr. Weismann, I find no tangible difference *except in the presence of the two spots on the under side of primaries and the costal patch on secondaries, which is seen on all the Napi*. All the *Napi* have one spot on primaries above, either distinct and black, or a cluster of black scales, and all have a patch on secondaries on both sides. These differences seem to be persistent, and indicate a departure in the American type. The females of the two forms differ also by the *presence of the two spots beneath* (*Napi*), *or in their total absence* (*Venosa*).

Venosa is the winter form in British Columbia, Vancouver's Island, Oregon, Washington Territory and California, and in all that region it is followed in its second generation by the summer form *Pallida*, Scudder. In the middle of the continent and to the eastward another winter form has replaced *Venosa*, viz.; *Oleracea hyemalis*. But not absolutely, for I have from Quebec a ♀ not differing in any particular from *Venosa* ♀ of Vancouver's Island. But this occasional appearance is probably owing to reversion.

Dr. Boisduval, Lep. de la Cal., p. 38, says of *Nasturtii* ♂, described as a Californian species: "Is this Pieris an American modification of our European species or a variety of *Oleracea?* It resembles much our *Napi*, from which it does not greatly differ, except that beneath the ground is less yellow, with the nervules more largely dilated . . . . and finally *because the two black spots of the upper side do not appear below*." This is *Venosa* ♂, resembling *Napi*, as I have before said, except in wanting these spots.

3. OLERACEA. The primary form throughout the polar regions of both continents being *Bryoniæ*, in the next generation there has come to be a divergence, some characters being present in the European (*Napi*) which are not found (or rarely if at all) in the American (*Venosa*), as I have shown above. But further, the American *has developed a second distinct winter form*, viz.: *Oleracea hyemalis*, originating apparently with the immaculate males of *Venosa*. That *Oleracea* was considered by Dr. Boisduval as peculiar to America is evident from his description, Spec. Gen. 1, p. 518: "*Oleracea:* Upper side absolutely as in our *Napi, but without any black mark, so that the four wings are wholly*

white, with the base of primaries a little blackened. Under side as in *Napi except that there are no black spots, and that the origin of costa of secondaries is a little saffron colored. It replaces in the U. S. our Napi.*" Boisduval, in describing *Napi*, says nothing of yellow or orange at the origin of costa of secondaries. When he speaks of *Bryoniæ* he gives that character, "almost always a little saffron colored." I find some European *Napi* without any shade at base of costa deeper than rest of the wing, others with a deeper yellow there, and in three examples the yellow deepens to pale orange. This orange shoulder is a persistent character in *Oleracea hyemalis*.

Dr. Harris described *Oleracea* in N. E. Farmer, and also in Ins. Mass., thus: "Wings white, dusky next the body; the tips of the upper ones yellowish beneath, with dusky veins; under side of hind wings straw-color, *with broad dusky veins, and the angles next the body deep yellow.*" This is *Oleracea hyemalis*.

In Agassiz' Lake Superior, Dr. Harris says: "*Oleracea:* Wings yellow-white, the anterior pair dusky on the front edge and base; tip beneath pale yellow with dusky veins, under side of the hind wings pale yellow with broad dusky veins and *a saffron-yellow spot in the humeral angle*. The tip of the fore wing is often marked with two or three dusky stripes in the males. (The dusky veining of the hind wings is less distinct in the females than in the other sex, and is sometimes entirely wanting. Specimens of the females have been seen, though rarely, with one or two dusky spots on the upper side of the fore wings). The last clauses, which I have enclosed in parenthesis, describe the summer form of the female, but the description of the male is of the winter form.

I am familiar with *Oleracea* as it appears in the Catskill Mountains of New York, having observed it at different seasons of the year, and bred the larvæ from eggs laid by females in confinement. The male of the typical winter form has the bases of the wings largely blackened, the costa of primaries heavily edged with black, and the apex more or less so; the anterior nervules are apt to be edged with black. The under side is either white with the faintest tint of yellow, or secondaries and the apical area of primaries are decidedly yellow, and individuals vary between these extremes. The nervures and branches on secondaries are bordered with gray-brown, sometimes heavily, sometimes moderately; so are the nervures of primaries moderately edged. The shoulders of secondaries are saffron or deep orange-yellow. Sometimes there is an indistinct spot on fore wings of male, usually a mere cluster of scales. The females are colored like the males, but have the gray at base of primaries more extended; so also along costa, but otherwise they agree with the males on both surfaces and vary in precisely the same manner.

But in the southernmost range of the species, where there is

more than one annual generation, some of the early or winter butterflies assume characters of the summer generation, due doubtless to intercrossing, which must take place, as belated individuals of the first brood would be on the wing when the earlier of the second brood appear. In my own experience I have had both heavy-veined and very light-veined butterflies in the spring from chrysalids of same brood of preceding year from the Catskills. Mr. J. Alston Moffat, of Hamilton, Ontario, has sent me 3 ♂ 2 ♀ taken by him between 13th and 26th May, 1877, and therefore of the first generation of the year. One male and one female have the veins moderately heavy; 2 ♂ 1 ♀ light, and like the usual summer generation. And Mr. Moffat wrote that he had 5 ♂ 1 ♀ remaining, caught at same time, of which two males were heavily shaded, one remarkably so, two lightly shaded, and one had the shading scarcely visible, and that the female corresponded to this last male in the light shading.

Although *Venosa* is the winter form of the Pacific Coast, yet occasionally an *Oleraeea hyemalis* is brought in by collectors. I have one male taken in 1880, by Mr. H. K. Morrison, on Mt. Hood, Oregon, of the extreme type, so far as indicated by the under surface, which is as heavily veined as a male of *Frigida* sent me by Mr. Scudder. Placed side by side I can see no difference between the two on this surface. But the upper side is neither grimy nor black-veined, like *Frigida*, and is like *Oleracea* of New York.

How far to the north we must go to find *Oleracea* monogoneutic I am unable to say. Kirby says that 3 ♂ were in the collection made by Richardson and submitted to him, and that these came from lat. 65°, which would be not far from the mouth of Mackenzie's River. What is remarkable is that *all of these were of the summer type*,* with merely a few scales on the nervures of secondaries below. This would imply that two generations fly at that high latitude, almost at the Arctic sea. On the other hand, I had, several years ago, from Mrs. Ross, of Fort Simpson, on Mackenzie's River, about 62° lat., a large number of specimens of *Oleracea*, all more or less heavily veined, the winter type. These were the Slave Lake examples referred to by Mr. Scudder in his paper on North American Pierids, 1861, in which he says that the indications therefrom are "that the paler forms are more commonly met with in the more southern localities, and the more heavily marked ones are the characteristic forms of the north." If one might hint that there was a mistake in labelling those pale butterflies of Richardson, the mystery would be cleared up, and otherwise I do not understand at all how *Casta*, Kirby, could be found at so high a latitude. A very large part of the lepidoptera described by Kirby are stated to be from Canada and other more southern localities. I have now before me five males of this lot from

*_Casta_, Kirby, being synonymous with _Oleracea æstiva_.

Slave Lake, and they are alike, immaculate, and heavily veined on under side. I have no female from Slave Lake to compare with others.

Several males from Godbout, Pr. Quebec, and from Anticosti, are like the Slave Lake examples, and four females from Anticosti are immaculate, and like the males, heavily veined, etc. These are *Oleracea* var. *Borealis*, Grote, Bull. Buf. Acad., 1873; described as having "the markings on the wings much darker and broader than usual, especially beneath." I had both the Godbout and Anticosti examples from Mr. William Couper, who spent two summers on the island and visited Godbout, which is on the main land, north shore of the St. Lawrence. As Mr. Couper did not meet with *Bryoniæ*, it cannot inhabit Anticosti, although that island is but one hundred miles from Newfoundland. This var. *Borealis* is of great interest in one respect. On the Continent we do not know where *Oleracea* becomes single-brooded. In New York and Canada it is double-brooded. It may be single or double at Slave Lake; except for Kirby's statement the evidences are in favor of its being single. At Godbout, where the snow lies nine feet deep in winter, and the summers are short, probably it is single. But in Anticosti, we know from Mr. Couper that the summer embraces only part of June and all of July, and that by 1st August the weather is turning cold. And it is his opinion that no species of butterfly on that island has more than one generation. Originally coming from the main land, *Oleracea*, whatever were its habits there, is, or becomes, single-brooded on the island, and breeds true to one type, the heavy veined extreme variety of the winter form. *Bryoniæ* in Newfoundland is a relic of glacial times, maintained by its insulation.

Frigida, Scudder, seems a little removed from typical *Oleracea hyemalis*. It is described as coming from Cariboo Island, Labrador, 2 ♂.2 ♀. The nervures of both wings are said to be more heavily marked than in the darkest individuals of *Oleracea;* "the black scales at base on upper side are more profuse and more widely spread, frequently bordering the nervures quite heavily; indeed, gray scales are more or less scattered over the whole upper surface, giving the insect a grimy appearance, increased by the slightest possible yellow tint." "The extreme limits of variation of *Oleracea* do by no means permit us to include within its boundaries this form; it is more heavily marked than the extremes of *Oleracea*." It is also stated that the hind wings of the male "are proportionately narrowed across the hind margin, and broader across a line parallel to it, near the base of the wing, than in male *Oleracea;* or, in other words, *the secondaries of Frigida are relatively more quadrate and those of Oleracea more triangular*." No special mention is made of female *Frigida*, and it is to be presumed that in general it resembles the male. In reply to a recent note on this subject, Mr. Scudder says: "I have only 2 ♂,

no ♀. The ♂ is like *Oleracea hyemalis*, but is duller, yellower, *and has longer hind wings with much longer discoidal cells.*" In originally describing this form Mr. Scudder had before him my Slave Lake examples, and when he says that *Frigida* "is more heavily marked than the extremes of *Oleracea*," he included in this last individuals as extreme as var. *Borealis*. *Frigida* is another island form brought over from the main land, beyond doubt single-brooded, and seems to have acquired some peculiarities of its own.

The summer brood, *æstiva* of *Oleracea*, is often of larger size of wings, and the wings are thinner, and purer white on upper side than in *hyemalis*. So the base is less obscured, the costa, apex and hind margin not at all. On under side it is either white or delicate yellow; the veins of both wings are but scantily edged with brown scales, and often not at all over considerable areas. The females have the basal and apical areas pale gray, and not infrequently there is a trace of the spot of *Napi* on upper median interspace. Sometimes also a trace of the second spot (in sub-median interspace), and of the gray bordering to inner margin of primaries. The veins beneath are rather more edged with brown scales than in the male. The shoulders of hind wings are of a *very pale yellow* (in *hyemalis* decidedly yellow or saffron), and often there is no color at all. There is some difference in the shape of the wings in each sex, some individuals having the apex of primaries more rounded than others, and secondaries more narrow.

I have found that eggs laid by females of *hyemalis* in confinement produce the same season butterflies, *aestiva*, and that eggs laid by *æstiva* produce the following spring *hyemalis*. But in one instance from eggs of *æstiva*, laid in the Catskills, there emerged, at Coalburgh, the following March, *two butterflies, one of which was* as *true æstiva as the parent, the other hyemalis.*

The summer form is identical with *Casta*, Kirby, described as having the wings white; black scales sprinkled over costa of primaries; secondaries beneath, with a few scattered black scales along the nervures. The female *Oleracea* of Harris, in Agassiz' Lake Superior, is this *æstiva*, as before mentioned.

Boisduval also described P. *Cruciferarum*, Spec. Gen., 519, ♂. A little smaller than *Rapæ*. "Upper side of the wings almost the same white, immaculate; primaries having only the anterior third of the costa and a part of the base dusted gray. Under side of secondaries and summit of primaries washed with very pale sulphur-yellow; secondaries have the origin of costa of a light yellow-orange. *It replaces our Rapæ in the middle U. S.*" As *Rapæ* was then (1836) unknown in N. A., this could only be *Oleracea æstiva*. That is, it is the summer generation of what Boisduval had before described as *Oleracea*.

Venosa, therefore, represents *Napi* (winter form) at the extreme west, and *Oleracea hyemalis* represents the same *Napi* to the eastward, in almost all known localities. Specimens from

Nevada and Colorado are usually immaculate and not distinguishable from *Oleracea hyemalis*. This form and typical *Venosa* are considerably unlike, but their summer generations approach and are often precisely alike. The summer generation of *Venosa* is *Pallida* Scudder, described; ♂ as "immaculate, yellowish beneath, with sometime a few indistinct grayish scales scattered along the nervules; otherwise quite immaculate. The female has, in addition, a *band of grayish scales on the posterior border of primaries*, and *a spot or cluster of grayish scales in upper median interspace*." All this is but the description of many examples of *Oleracea æstiva* ♀, and of all males. But the variety of the summer form of *Venosa*, which has a black spot on primaries, was not before Mr. Scudder when he drew up his description. This is *Castoria*, Reakirt, the male only described; it is said to have "*a rounded black spot on the medio-superior interspace of primaries;* no other markings; underneath immaculate." *Castoria*, then, is one sub-form, *Pallida* the other, and both undoubtedly appear in same brood, *i. e.*, in the generation following and proceeding from *Venosa*.

Of four ♂ under view from Lake Lahache, Brit. Col., 2 are immaculate (*Pallida*), 2 have a light spot (*Castoria*). I have but one ♀ and that has no spot, but the marginal border is gray. From Vancouver's Island 1 ♂ is immaculate, one has half a dozen scales only in place of a spot; but a third ♂ has a black spot. With these are 2 ♀ and both have the two spots of *Napi* and dark border. 1 ♂ from Oregon is immaculate. Four males from Washington Terr. are immaculate; but the 2 ♀ with them have both spots and the border. *One of these is yellow on upper side.* Two males from California have the upper spot only, their females both spots and the border. One female from southern Colorado has both spots and border, but the males accompanying are immaculate, and may be called either *Pallida* or *Oleracea æstiva*.

It appears therefore that while several males from the Pacific coast, under view, are immaculate (*Pallida*), about one-half have the spots in greater or less degree (*Castoria*), but that all the females except one have, on the upper surface, the spots and dark border to primaries which characterises *Napi*, and the one exception has the dark border. One female *Pallida* from Washington Terr. is of a pale but decided yellow on both surfaces—another departure. I have noticed this in no *Oleracea æstiva*. Just as from *Rapæ*, in New England, there has developed a yellow form, the *Nova-Angliae* of Scudder.

We have seen then that starting with the common form *Bryoniæ*, the next generation, *Napi* in Europe, *Venosa* in America, differs perceptibly. Also that *Venosa* has an offshoot in *Oleracea hyemalis* which occupies a more extensive territory than the parent. Now the second generation of these two, which corre-

sponds to *Napææ*, is far removed from that form. *Pallida* ♂ is immaculate on both sides, its co-form *Castoria* has a spot on primaries, otherwise immaculate on both sides. The common ♀ has a gray border to inner margin of primaries, and a spot on same wing: otherwise immaculate on both surfaces. *Oleracea æstiva* ♂ is immaculate on both surfaces, the ♀ also, except that a few scales sometimes suggest a spot on upper side, and sometimes there is a slight and pale bordering to inner margin.

But *Napææ* ♂ has *one or two black spots* and marginal border, *two spots on under side, a spot at outer angle of hind wings on both sides; the whole costal edge on under hind wing deep yellow*, things never seen in American examples. The ♂ *has two or three large and deep black spots, &c.* In fact, THE ♂ NAPÆÆ RESEMBLES BRASSICÆ ♂ MORE CLOSELY THAN IT RESEMBLES THE FEMALE OF THE CORRESPONDING AMERICAN FORM.

4. VIRGINIENSIS. I described this form as Pieris *Virginiensis* in Butterflies of N. A., vol. 1, and gave accurate figures of both sides of both sexes. The male above is more or less obscured by brown, or dusted with brown, and often to a considerable degree. In some examples the brown scales are scattered over the whole surface, but are dense on apex, costa and basal half of primaries, and at base and along the principal nervures of secondaries; a gray patch also on costa of secondaries. Under side *always white* (*Oleracea* and *Pallida* are most often yellow), the *nervures and branches bordered with ashy-brown of a shade not found in any American form except Hulda.* Individuals vary in the extent of this brown, from slight to very considerable. The female has the upper surface more obscured, and the brown edging to the nervures and branches is sometimes so extensive as almost to conceal the ground color, as in *Hulda*. *Virginiensis* is smaller than *Oleracea*, the males averaging 1.7, and no female examined expanding over 1.9 inch. The wings as a rule are longer and narrower than *Oleracea*, though the latter, as before stated, varies in this respect; and they are delicate as in *Oleracea æstiva* if any thing more delicate and thinner.

The first examples of *Virginiensis* ever seen by me were received from Mr. Wm. Saunders, the ♂ having been taken in Ontario, the ♀ at Quebec. They were sent as *Oleracea* with several of the latter. I have three males from north and south Colorado. In my collection I have 12 examples, 5 being those mentioned, and 7 from Coalburgh. Mr. Mead has taken a female at Stony Clove, Hunter, N. Y., on the Catskill Mountains.

For several years, and up to 1872, a few individuals were taken at Coalburgh in each year, usually in April, once in last half of March, and once only in May, and there was no other Pieris flying at the same season in these years except *Vernalis*, the spring form of *Protodice*, and that was seen very rarely, some years not

at all. The dates of capture of *Virginiensis*, or when they were seen, but not captured, are recorded in my journal thus:

1867,	11th	April	took	1 ♂.	1871,	20th	March	took	1 ♂
	21st	"	"	2 ♂.		" 7th	April	saw	2 ♀
1868,	24th	April	"	1 ♀.		" 8th	"	saw	1 ♂
1869,	25th	"	"	1 ♂.		" 9th	"	took	4 ♂
	28th	"	"	12 ♂.	1872,	17th	"	"	1 ♂
1870,	15th	May	"	1 ♀.		" 29th	"	"	5 ♂

The spring of 1870 was cold, and we had ten inches snowfall on 18th April. In 1871, on the other hand, we had fine weather all through March, and peach trees were in bloom on the 11th. Therefore the appearance of *Virginiensis*, so early as 20th March, 1871, and so late as 15th May, 1870, is accounted for. Strictly, it is an April butterfly, coming with the early flowers.

No second generation appeared here in these years. In the first place, it is hardly possible that I, myself, should have failed to take or see individuals of a later generation if there were any. One single example during these six years would have served to attest the existence of a second generation. Also, I had boys in my employ instructed to take everything; and of *Virginiensis* subsequent to May, or of a second generation, none appeared in their collectings. In the next place, between 1867 and 1872, the late Mr. Ridings, a most indefatigable collector, spent one whole season here, and again the month of September. Mr. Julius E. Meyer, a month in midsummer of two years, and again in September. Mr. Mead collected here repeatedly, both before and after 1872. All these gentlemen were experts with eye and hand, and thoroughly acquainted with North American diurnals, but no one of them found an example of the second generation of *Virginiensis*. Therefore I assert with confidence that such a generation has no existence here.

In 1874, *Rapæ* first made its appearance in this valley. I recorded as follows: 1874, 17th September, "took 1 ♂ *Rapæ*, the first of this species ever seen here by me." On 6th Oct., "saw several *Rapæ*.' In 1875, 8th April, "saw several *Rapae*," and from that day to this the species has abounded all the season. I was absent from home from 1st April to 15th May, 1873, and so know nothing of *Virginiensis* that year; but since 1873 I have not seen one example, though I have carefully sought for it in the hope of breeding from the egg, and so learning its history.

But so long as *Rapae* is a thousand to one, the weaker species will be overlooked at least, being undistinguishable on the wing among so many white butterflies of same size, and probably will soon become extinct. Perhaps it is already extinct in this locality. I hear from Massachusetts, New Hampshire, New York and Canada, the same story of the absolute disappearance of *Oleracea* where, fifteen years ago, it abounded, before *Rapæ* had conquered the country.

I have no information as to the month in which *Virginiensis* has been taken in any northern or western locality, except in the one instance spoken of, when Mr. Mead captured a female, which was in the last week of June, 1873, in the Catskills. This was undoubtedly one of the first generation. (Stony Clove has an elevation of 2,500 feet, and the trees there are not fully in leaf before June.) Mr. Mead set this female in a bag on the food plant and obtained many eggs. In a letter dated July 10th, he says he had then but one larva, one quarter grown, which would be after the second moult. July 18th, he had sent the chrysalis from this larva to Miss Peart for a drawing, and the drawing I have. Mr. Mead informs me that from this chrysalis emerged *Oleracea*.

We must conclude, therefore, that *Virginiensis* is an offset of *Oleracea hyemalis*. It is singular that it should be so, differing as this form does from *hyemalis* in *the delicacy of the wings, their pure white color beneath, and in the paleness of the yellow humeral border*. All which is in direct contrast to *hyemalis*. So the wings are narrower than in *hyemalis*, and the gray brown dusting and bordering of the nervules is in strong contrast with the same form. It would seem in several respects more likely to have come from *æstiva*. In West Virginia, this form *Virginiensis* is also of the winter generation, and breeds true to its type, as appears by all the examples taken during a series of years. As I have said before, it has no second brood in Virginia. The offshoot of a polygoneutic species has become single-brooded or monogoneutic. This is probably the result of climate. *Oleracea*, *Napi*, *Bryoniae*, all are northern forms. The fauna of this region is southern, whether botanical, ornithological or entomological, or at least much more southern than northern, and the long hot summers are not favorable to this Pieris. The mild winter permits a modified form, more like the summer generations of the north than the winter generation, and this is held true to type by there being no second brood.

The first or original winter form, *Bryoniæ*, was left in the sole possession of its arctic territory, after, by its southward emigration, a climate had been reached which allowed two annual generations to mature, and what then began as the summer form ended by displacing its parent over the sub-boreal regions, and itself became the second winter form, *Venosa;* developing a second generation of its own, *Pallida*. But, collaterally, through *Oleracea hyemalis* comes *Virginiensis* which along the southern limit has in its turns displaced *Venosa*, being in sequence of derivation the third winter form. But this has no second generation, and in habit is like an *Anthocharis*, in which genus the butterflies appear in spring, and have no second brood, all the chrysalids going over to the next year. In fact, *Virginiensis* has parted company with *Venosa* and the rest, and has become a true species, although unquestionably, in a higher latitude, it appears as an occasional aberration only of *Oleracea*.

The chrysalis of *Virginiensis* as appears by the colored drawing spoken of is of precisely the same shape as that of *Oleracea*. It has a minimum of black dots over its surface. On the other hand the chrysalis of *Bryoniæ* from Newfoundland shows a maximum of these dots, and several little dusky clouds or spots, as might be expected from the clouded and spotted wings which are to issue therefrom. The chrysalis of *Venosa*, from California, comes next to *Bryoniæ* in these marks: that of *Oleracea* var. *Borealis*, from Anticosti, having few marks, like *Oleracea* in New York. I have drawings of all these; and of all but *Virginiensis* have preserved chrysalids also. There is not the least difference in shape in these chrysalids.

We are now prepared to tabulate the American forms derived from *Bryoniæ*, and I contrast them with the corresponding European forms:

EUROPEAN.	AMERICAN.
1. Arctic form BRYONIÆ, Ochs.	1. Arctic form BRYONIÆ, Ochs. var. HULDA, Edw.
2. Winter form NAPI, Esper.	2. 1. Winter form VENOSA, Scud. *Nasturtii*, Bois. aberr. ♀ FLAVA. 2. Winter form OLERACEA HYEMALIS, Harr. *Oleracea*, Bois. var. A. BOREALIS, Grote. " B. FRIGIDA, Scud. aberr. VIRGINIENSIS, Edw.
3. Summer form NAPÆÆ, Esper.	3. 1. Summer form ACADICA. 2. Summer form *a*. PALLIDA, Scud. *b*. ♂ CASTORIA, Reak. aberr. FLAVA. 3. Summer form OLERACEA ÆSTIVA, Harr. *Casta*, Kirby. *Cruciferarum*, Bois.
	4. SPECIES (Southern) VIRGINIENSIS, Edw.

I believe this to be an accurate statement of the phases of the American forms derived from *Bryoniæ*, and it is based on my own acquaintance with them. Not being so familiar with the European derived forms, and restricted to descriptions, plates, catalogues and such specimens as I could collect by the aid of friends, I can only give the three principal and well-known manifestations, doubtless omitting some important variations not named. But the general statement on one side, and the particular one on the other, are sufficient to show how climate and environment affect the descendants from a common parent-form. How the differences, at first slight, gradually become

considerable, and at last the outcome of the derived forms on the two continents is distinct, the late descendants being parted by specific differences. How an aberration leads to a permanent variety; how insulation produces permanent varieties; how a variety becomes a species, breeding true, not subject to reversion, and adapted by change of habit to altered circumstances.

NOTE.—Since this paper was put to press, I have received from Dr. Staudinger 2 ♂ and 2 ♀ of Lapland *Bryoniæ*.

One of the males has the nervules and branches of under side of secondaries bordered with brown in same manner as the Alpine examples spoken of; but the other has an excess of the brown edging, so that nothing of the ground color of the wing is seen except a narrow stripe in cell and streaks in the interspaces of the nervules. In this respect this example resembles *Hulda*.

NOTE ON PLATES.—These were drawn and printed in London, and no opportunity for correction of errors could be given. Figs. 7, 11, and 13 would represent the forms as having black spots on under side of primaries, contrary to the statement of the text. The artist has mistaken discoloration caused by the transparency of the wing, and only apparent when held to the light, for spots; but in all these butterflies the surface is absolutely free from black scales at the points indicated, and is white or yellow, whereas in *Napi* and *Napææ* the black spots of underside are caused by black scales laid on.

DESCRIPTION OF PLATES.

PLATE 2.

WINTER FORMS.

EUROPEAN.

1. *Bryoniæ* (Alps) ..... ♀
2. *Napi* (Germany)..... ♂
3. *Napææ* " ..... ♀

AMERICAN.

4. *Bryoniæ* (Newfoundland) .. .. ♀
5. *Hulda* (Alaska, &c.)..... ♀
6. *Venosa* (California)..... ♂
7. " " ..... ♀
8. *Oleracea hyemalis* (New York).. ♂
9. *Borealis* (Anticosti)..... ♂

PLATE 3.

SUMMER FORMS.

AMERICAN.

10. *Acadica* (Newfoundland)..... ♂
11. " " ..... ♀
12. *Pallida* (Vancouver's Island).. ♂
13. " " " .. ♀
14. *Castoria* (California)..... ♂
15. *Oleracea æstiva* (New York)... ♂
16. " " " ... ♀
17. *Virginiensis* (Coalburgh, W. Va. ♀
18. " " " . ♂

DESCRIPTION OF SOME NEW SPECIES OF N. AMERICAN MOTHS.

By Hy. Edwards.

EULEUCOPHÆUS SORORIUS. n. sp.

♀. Primaries pale reddish brown, a little paler at the posterior margin. The lines are broad white, the inner one oblique, not curved, and not reaching to the costa, the outer one slightly waved about the centre towards the posterior margin. In the median space, a little nearer to the inner than the outer line, is an oblong discal mark of yellowish brown. The costa at the base is brownish, in the median space it is flecked with white scales, and at the apex it is white from the junction of the exterior line. Fringe and internal margin whitish, with a pink tinge.

Secondaries, dull reddish brown, paler on the disc; the nervures very strong and distinct; the fringes clear white.

Beneath, the wings are pale reddish brown, the bands of the primaries faintly exhibited.

The fringes and the costal margin of secondaries clear white. Head, red brown, orange at the base of the antennæ. Thorax, red brown, with long grizzled hairs. Abdomen, chestnut brown, with broken whitish lateral bands. Antennæ beneath and tarsi bright orange.

Exp. wings, 3.00 inch.

1. ♀. La Paz, Lower California.

Type. Coll. Hy. Edwards.

GLOVERIA ARIZONENSIS. Packd.

♂. A specimen of this very rare insect is in my possession, and is, as far as I am aware, the only example of the ♀ sex known. It differs considerably from the figure of the ♂ in Mr. H. Strecker's "*Lepidopt. Rhoph. et Heter.*" Pl. 15, and I therefore offer the following description:

Primaries, brownish gray, covered with very long hairs, which have their origin at the base of the scales. These hairs are white at their tips, and give the insect a very grizzled appearance. Of the lines enclosing the median space, the basal one has a small tooth directed inwardly at its centre, while the exterior line is slightly curved throughout its length; the space between it and the outer line being rather widest on the costa- In the median space, nearest to the basal line, is a round white spot, clearer than is represented in the ♀. The submarginal line is nearly parallel with the median line, with the posterior edges dentate, though the teeth are not so deep as in Mr. Strecker's figure. Fringes concolorous. Secondaries, chocolate brown, with a grayish tinge, the hairs fewer than those on the primaries. Fringe, dusky white, speckled with gray. Beneath, the wings are all brownish gray, with the same grizzled appearance as on the up-

ger surface; the fringes being wholly dusky white, mottled with pray.

Exp. wings. 3.15 inch.

Prescott, Arizona.

Type. Coll. Hy. Edwards.

PLUSIA CELSA. n. sp.

Allied to *P. 8-scripta* and *P. U. aureum*, but with the ground color of the wings of a paler shade of grey. There is also a resemblance to faded examples of *P. viridisigma*, Grote. The lines are all distinct, the spaces between them being deeply shaded with blackish, especially towards the internal margin. The t. a. line is whitish, edged with black, and becomes almost obsolete on the median nervule. The t. p. line is nearly even throughout its length, whitish, and as the t. a. line, edged with black. The submarginal line bold, distinct, toothed as in *P. viridisigma*, and shading into bright, pale grey on the margins. Metallic spot, greenish golden, generally, though not always, divided into two portions, the lower being a circular spot, and the upper triangular; the base resting on median nervule. Where joined by a small golden line, the spot in shape resembles that of *P. Gamma, L.* Secondaries ochraceous, with broad dusky margin and dusky shading at base. Fringe sordid white. Underside of primaries dusky, of secondaries ochraceous, with discal spots strongly marked; some whitish dashes on primaries, the margin of secondaries dusky. Fringes, alternately white and dusky.

Size of *P. U-aureum.*

2 ♂. 1 ♀. Mt. Hood, Oregon. (H. K. Morrison.)

1 ♀. Dalles, Oregon. (Hy. Edwards.)

Type. Coll. B. Neumoegen.

XANTHOTHRIX NEUMOEGENI. n. sp.

Whole insect, rich bright orange. Primaries with basal line wanting. A median and sub-marginal band rather broad, brownish orange, the inner one curved at the middle, and bent obliquely towards the costa; the outer slightly dentate, on the apex a paler spot. Margins brownish orange. Fringe orange, darker at extremity of nervules, which are very strongly marked, brownish. Secondaries with small blotch at base, a lunate discal spot, and the apex brownish. Under surface, wholly orange, with a faint discal spot on primaries. Head, thorax, abdomen and legs, wholly orange. Antennæ brownish.

Exp. wings. 0.85 inch.

Sta. Barbara Co., Cal. Mr. T. L. Mead. S. California, H. K. Morrison.

Types. Coll. B. Neumoegen, Hy. Edwards.

I have dedicated this exquisite speeies to my friend Mr. B. Neumoegen, whose earnest labors in his favorite science are worthy of the widest recognition, and to whom I am indebted for much valuable assistance.

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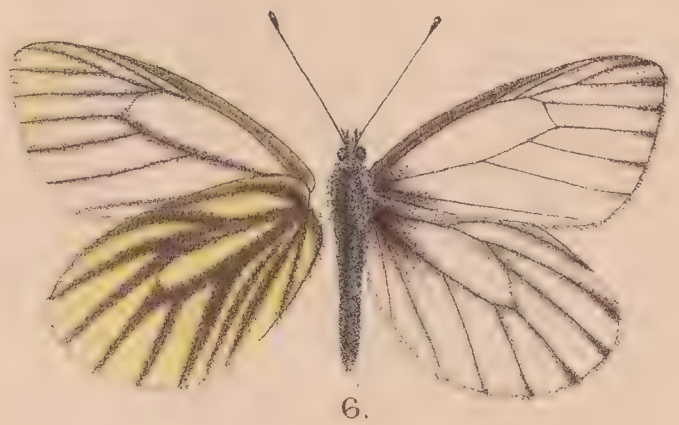
2.



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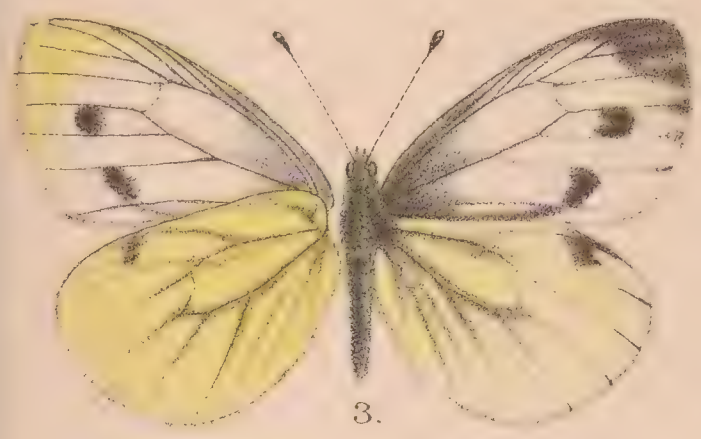

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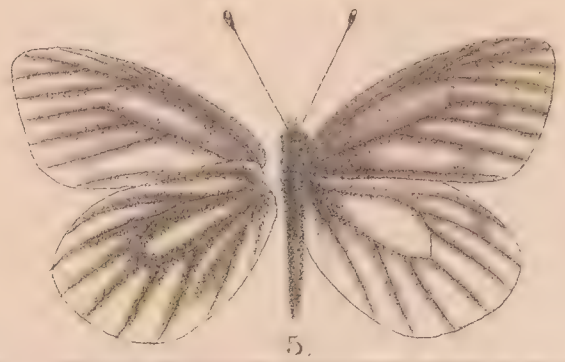

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A.H. Searle del. et lith.

WINTER FORMS.

Mintern Bros. imp.

10.

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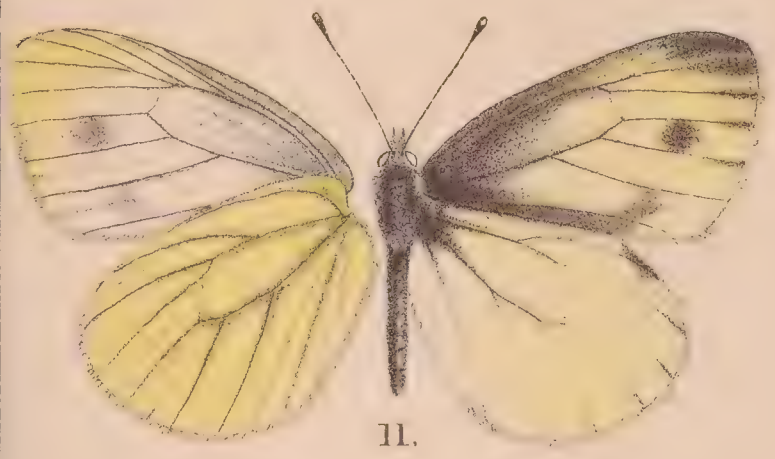

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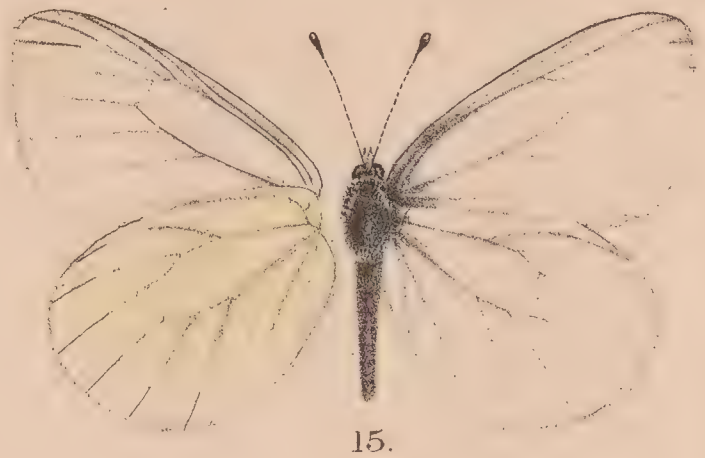

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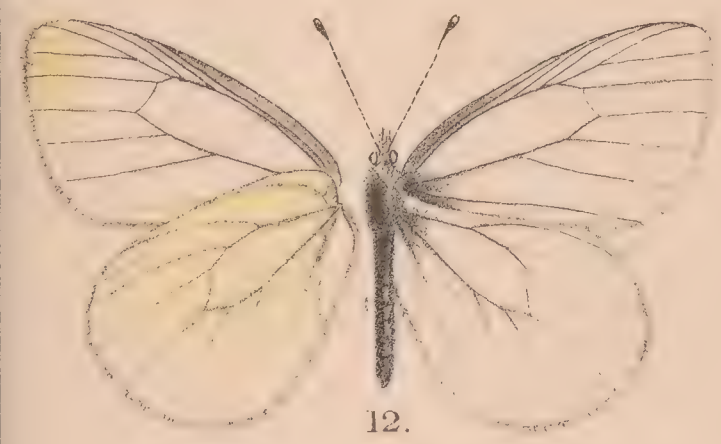

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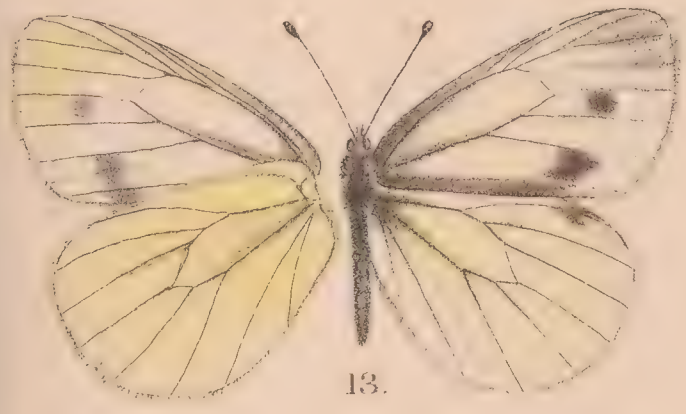

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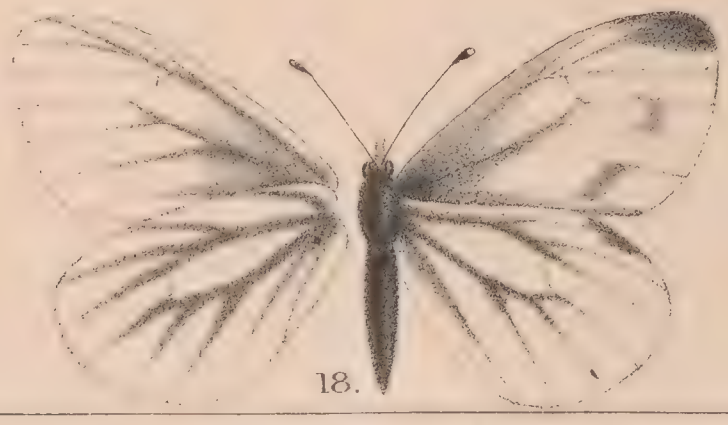

18.

A.H. Searle del. et lith.

SUMMER FORMS.

Mintern Bros. imp.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] July, 1881. [No. 7.

NOTES ON SOME NORTH AMERICAN LEPIDOPTERA.

By Arthur G. Butler.

Our good friend, Mr. Henry Edwards, has recently presented to the British Museum a series of 115 Lepidoptera with pupa-cases &c.; and, as at the same time, he writes that a few notes on these insects might prove interesting to the readers of "Papilio" I gladly forward observations on the *Sphingidæ*, which (if acceptable) I will supplement by remarks on the other groups.

Hemaris cynoglossum. *H. Edw.*

This species is nearly allied to the Texan insect to which I gave the name of *H. metathetis*. It differs in being slightly smaller and with the external dark brown border of the primaries of only two-thirds the width; these appear to be the only noteworthy distinctions between the two forms.

Pterogon clarkiæ. *Boisd.*

This species, of which we previously possessed specimens presented by Lord Walsingham, although very similar in coloration to *P. œnotheræ* of Europe, agrees better structurally with my recently described genus *Cinogon*, differing from the latter principally in its even less dentated wings and better developed anal tuft. If *Lepisesia victoria* be conspecific with *P. clarkiæ* the generic name ought certainly to be retained for this species. The name *Proserpinus* must be rejected altogether, as it is the original name of *P. œnotheræ;* (which should therefore stand as *Pterogon* '*proserpina*' of Pallas).

Deidamia inscripta. *Harr.*

Seems, excepting in the form of secondaries, to be intermediate in structure between *Lophura continua* (of Brazil) and *Amphion nessus:* It also seems allied to *Mimas* and *Cypa*, two old world genera of *Smerinthinæ*. To which has it really most affinity?

Enyo lugubris. *Linn.*

The example sent by Mr. Edwards was taken at Indian River,

Florida, and agrees with examples of *E. camertus*, Cramer, in the Museum collection from Mexico. I am, however, quite prepared to believe that this red form is merely a common sport of the Linnean species.

AMPELOPHAGA VERSICOLOR. *Harris.*

I am very much interested in seeing this species for the first time; judging by Strecker's figure only, I referred it to *Elibia*, but (as he has himself declared) "the only point in common between" *E. dolichus* "and *versicolor* is the pale dorsal line," though strictly speaking, Strecker should have said the only salient point, since, to mention another point, they are both *Sphingidæ.*

Now, that I have examined and compared *versicolor* in the chitine, (I suppose I must not say "in the flesh") I find that it agrees in every detail of structure and nearly every detail of pattern with *Amphelophaga rubiginosa*, of Bremer, from China and Japan.

From *Otus chœrilus* and *myron, Ampelophaga* is distinguished by its less falcated and less distinctly sinuous (the German word "geschwungen" best expresses the character) outer margin of the primaries, fuller secondaries, well defined dorsal line on the body and more curved banding of the primaries. I mention the color characters because they usually represnt a sub-generic if not a generic value.

CHŒROCAMPA TERSA. *Linn.*

An example from Florida sent by Mr. Edwards comes nearest to specimens in the collection from Mexico.

DEILEPHILA LINEATA. *Linn.*

So far as I have hitherto been able to judge, this moth does not vary in anything but size, 66 to 100 millimetres in our examples.

PHILAMPELUS ACHEMON. *Drury.*

Mr. Edwards has sent us the pale variety of this beautiful species, and although I have no remarks to make about it, I may perhaps be permitted to speak of another New World *Sphingid*, recently referred by Dr. Burmeister to this genus.

Quite recently, through the generosity of Walter de Rothschild, (the eldest son of Sir Nathaniel) we acquired a specimen of the *P. Eos* of Burmeister from Buenos Ayres, and I am quite satisfied from a careful comparison of this species with the whole of our *Sphinges* that it is either an *Ambulyx* or a genus extremely close to it, and has no affinity to *Philampelus.*

SMERINTHUS OPTHALMICUS. *Boisd.*

I am glad to find that I rightly identified this species in my "Revision of the Sphingidæ," although at the time I had very little doubt about it.

SPHINX CHERSIS, VAR. OREODAPHNE. *H. Edw.*

If this form is constant to any district, I see no reason why

it should not be regarded as a distinct species; it is not only considerably smaller than our examples of *S. chersis*, but the primaries are comparatively shorter and the coloration decidedly bluer in character.

SPHINX PERELEGANS. *H. Edw.*

Although nearly allied to *S. chersis*, this species (in the pattern and coloration of the secondaries) takes a step in the direction of *S. leucophæata.*

ANCERYX EDWARDSII, sp. n.

Allied to *A. fasciata* Swainson, and *A. alope* Drury; the primaries altogether blacker, more sericeous, the zigzag black lines more equally angulated between second median branch, and inner margin relieved by a white instead of a pale brown background, the central black line on the dorsal abdominal band less strongly defined than in *A. fasciata*, and therefore similar to that of *A. alope.* Expanse 81 millimetres.

Indian River, Florida. *H. Edw.*

Mr. Edwards sent a male example with note—"We have called this *Anceryx scyron*, but think we must be in error. Will you kindly tell me its real name,"—and as it does not belong to the *scyron* group (Genus *Isognathus* Felder) and moreover has not hitherto been named to my knowledge, I have taken the liberty of dedicating it to my excellent friend.

Isognathus scyron is a species occurring in Surinam, of which I have hitherto seen only one example, and that not in our collection; like my *I. metascyron* it has a red-brown abdomen banded with black.

Anceryx alope (unlike the species of *Isognathus*) has a brownish white body transversely banded with black, and dorsally banded with dark grey striped with black, the anal segment being of a reddish wood-brown color at the sides and black in the centre; the wings and thorax are pale red brown, but so widely suffused and striped with dull slatey grey and black that very little of the ground color appears, an oblique diffused streak across the median interspaces and cut by the zigzag *discal* * lines whitey-brown (but not white); the secondaries are bright orange to a little beyond the middle, the remainder being dull black with the border very slightly greyish and a marginal series of intense black dashes, or in other words an interrupted black marginal line: from this form Swainson's *A. fasciata* is distinguished by its distinctly whiter body, paler primaries, which are often largely varied with the red or whity-brown of the ground colors. In *A. Edwardsii*, on the other hand, this reddish brown coloration is confined to the thorax and the fringe of the wings.

CAUTHETIA, sp.

"*Ænosanda noctuiformis*, Walk" on label.

(Two examples) Indian River, Florida.

I hope Mr. Edwards will describe this pretty little species; it

* Guenee and others have wrongly used this term instead of "*discoidal*" in speaking of markings upon the wing-cell.

does not agree with Walker's type from St. Domingo, the primaries are considerably darker, and the dark brown border of the secondaries of only half the width: it must be distinct.

A PARASITE IN ÆGERIA SYRINGÆ. HARR.

By G. H. French, Carbondale, Ill.

When examining the stems of some lilac bushes in my yard, I found a place in the bark of one where it seemed that an Ægerian pupa might soon protrude for the purpose of liberating the moth. Upon cutting away the thin film of bark, I found the end of a chrysalis visible. I carefully cut away the wood, took this out and put it in a jelly dish surrounded with lilac leaves to prevent its drying up, and waited for the imago to come forth. June 5th, a week after the chrysalis had been put into the jelly dish, I saw something among the leaves which I supposed was the expected moth, but which proved to be a hymenopter. I did not know but the insect might be one of the boring bees that often resort to the holes left by Ægerians in which to rear their young, but an examination of both the insect and the empty pupa case assured me that I had a parasite. The chrysalis was certainly that of an Ægerian, having all the characteristic marks of the pupæ of that family; and the insect in emerging from it had gnawed a hole near the end on the left side instead of the usual method of emergence of insects from their own pupa cases. More than this, the specimen was a true Ichneumonide and not a Crabronide as I at first thought it might be. This is the first time I have known of any parasite working in the Ægerians.

I make the parasite to be *Phæogenes Ater*, Cres. It is shining jet black, 40 of an inch long, the antennæ 25 jointed, the first 8 black, the next 4 white and the rest dark brown. The joints of the legs are a little pale.

It is impossible for me to say when the parasite was introduced into its host; but it must have been before it pupated, because the chrysalis when taken from the bush was entire, showing no broken place. That the Ægerian was *Æ. Syringæ*, I have no doubt, as I do not know of any other boring in the lilac.

LEPIDOPTEROLOGICAL NOTES.*

By Professor C. V. Riley.

Plusia brassicæ, Riley (Rep. II. p. 111).—Notwithstanding its close resemblance to *ni*, the best authorities agree with Zeller in considering it distinct, as it certainly is. Strangely enough

*From advance sheets of Bulletin 6, U. S. Ent. Comm., being General Index and Supplement to the Missouri Entomological Reports.

this same *brassicæ*, or what is extremely close to it, occurs also in South Europe and is figured in Stainton's *Entomologist's Annual* for 1870 as *P. ni*, one specimen having been found on the south coast of England, which specimen Zeller, as he wrote me, believes to have come from America. Staudinger would probably characterize *brassicæ* as a "species Darwiniana," and there are doubtless individuals of both the species which approach each other so closely as to be undistinguishable. There is such variation in the silver spot in either that it cannot be depended on alone, but Speyer (Europäisch-Americanische Verwandtschaften; *Stettiner Ent. Zeit.*, June, 1875, p. 165) has presented other differences that are constant in detail, the most noticeable of which are the darker and more irrorate coloring and the interrupted and wavy terminal line of *brassicæ*, against the paler, smoother, more metallic coloring and the perfectly straight and unbroken terminal line of *ni*.

The larva is the most common cabbage pest in the Southern States, and is infested with an undetermined parasite. Mr. E. A. Popenoe has found its feeding on the leaves of *Crepis*, and what appears to be the same has been found by my assistant on Clover, Dandelion, *Senecio scandens*, and *Chenopodium*.

GORTYNA NITELA Guen. (Rep. I, p. 92)—I have proved by breeding that *G. nebris* Gn. is but a large, southern form of this species. In the Southern States it is most common in stems of *Ambrosia trifida*, often producing a swelling or pseudo-gall. Both forms are indiscriminately bred with intermediate variations. See an article by Miss E. A. Smith (7th Report on the insects of Illinois, Cyrus Thomas, pp. 112–114) for additional food-plants and the habit of the younger larvæ to infest wheat-stalks, corn, etc. See also Am. Ent. I, p. 252; my "Potato Pests" (Orange, Judd & Co., 1877, p. 91) and *Prairie Farmer*, August 11, 1877. The insect normally purpates in the stem and when infesting thin stalks like those of most cereals and blue-grass (in which it also is found), often of necessity leaves one stalk for another.

ANOMIS XYLINA, Say (Rep. II, p. 37; VI, 17)—This has since been referred by Grote to Hübner's *Aletia argillacea*, which has been generally adopted. See Bulletin 3 of the Commission on the Cotton Worm. While it will doubtless be found convenient in future to separate it from the other species of the genus *Anomis* and Hübner's generic name may therefore obtain, I must confess after a careful examination of Hübner's figure of *argillacea* to grave doubts as to the correctness of Grote's reference thereto of our Cotton-worm Moth (*xylina*, Say). Hübner's figure lacks several of the most constant characteristics of *xylina*. It is fulvo-testaceous shaded with brown, with the under side bright yellow. It lacks the three white specks on primaries and has a dark (*orbicular ?*) spot in place of the outer one. It has a large white circular spot with black annulus in place of the dusky elongate discal spot with its double pupil. The wavy lines are almost black and

differ in form ; the fringes are unicolorous, and the abdomen is narrower. The figure more nearly represents in fact a species which I have received from Bahia, Brazil, and which differs from *xylina*, though the larva (also quite different) feeds on cotton.

We are all inclined to follow determinations of those who make a specialty of any group, but after due allowance for faulty coloring in Hübner's figure, I am constrained to believe that in this instance Mr. Grote has been in fault.

PEMPELIA GROSSULARIÆ Packard (Rep. I, p. 140)—The European *Zophodia convolutella* Hübn. (*Phycis grossulariella* Treitschke), which has precisely similar habits, closely resembles this species. In 1871 I compared it with this last in Mr. Stainton's collection and with specimens received from Prof. Zeller and could detect no essential differences. The European specimens are slightly larger, with broader wings and usually clearer, paler gray coloring. Colorational markings are, however, very variable in specimens from both sides of the Atlantic.

P. grossulariæ Packard was subsequently described by Grote as *Dakruma turbatella* (Bull. U. S. Geol.-Geog. Survey, IV, No. 3, p. 702 ; 1878). *Dakruma* seems to differ from *Zophodia* in nothing but the absence of the basal portion of the subcostal vein and possibly, although this character is not mentioned by Grote, in the recurved palpi. According to the synoptical table given by Heinemann, *grossulariæ* would fall in the genus *Stenoptycha*, distinguished from *Zophodia* by the recurved palpi. We may well question the generic value of this character, for different authors describe it quite differently: thus, Heineman describes the palpi of *Stenoptycha* and *Homeosoma* as recurved, whereas Grote describes them as porrect in these two genera, if we accept his statement that *Honora* Grote is to be considered a section of *Stenoptycha:* there appears also to be a difference in position in specimens of the same species, according as the palpi are heavily scaled or have lost the scales. From the known individual variation in the venation of these and other moths, especially in the hind wings, we cannot attach any specific, much less any generic, value to the slight difference in the subcostal vein of *Dakruma* noted above. Moreover, authentic specimens of *grossulariæ* do not appear to possess this character of *Dakruma*. I am, therefore, of opinion that a study of sufficient material from both continents will prove the two specifically identical, or at the most that our American insect is a variety, and that *Dakruma* will not obtain. Packard is of this opinion, as in the later editions of his *Guide* the species is called *Myelois convolutella*.

PENTHINA VITIVORANA Packard (Rep. I, p. 133).—This is identical with a European insect having the same habits. It was first described over a century since by Schiffermiller & Denis as *Tortrix botrana*, and has been referred to various genera since, and finally to *Eudemis* Hübn., so that the insect should be known

as *Eudemis botrana* (Schiff.). *Conchylis ambiguella* (Hübn.) has very similar habits in Europe. See Nördlinger's "Die Kleinen Feinde der Landwirthschaft," p. 424 ff. It is the *Lobesia botrana* of the later editions of Packard's *Guide*.

EURYPTYCHIA SALIGNEANA Clem. (Rep. II, 134).—This according to Prof. Fernald, who has seen the type, is the same as Clemens's *Hedya Scudderiana* (Proc. Acad. Sci. Phila., 1860, p. 358), the description of which is very brief and presumably taken from a female. The genus *Euryptychia* (Proc. Ent. Soc. Phila. V, 140) is founded on the male, which has a broad fold extending to the middle of costa on the primaries and covering up a pencil of yellowish hairs. Zeller subsequently redescribed it as *Pædisca affusana* (Beiträge, etc., pt. III, p. 101 [307]). From a comparison of female specimens I am led to believe that this is the same species that is commonly known in Europe as *Spilonota roborana* Schiff., though in Staudinger and Wocke's Catalogue *cynosbana* Fabr., described in 1875, is given the priority and *aquana* Hübn. is placed as a synonym. The obliquity of the edge of the basal dark patch and the details of the occellated spot upon which species have been separated, I find to be variable.

The insect in Europe is known to feed on the leaf-buds of the rose. I have abundant proof that in this country it is not a gall-maker, but, as was inferred in the Report, an inquiline. I have found its larva feeding upon the flowers as well as amid the terminal leaves of the Golden-rod, and have also found it in other galls. When feeding in the more exposed positions it generally has a carneous or rosy tint.

ANCHYLOPERA FRAGARIÆ W. & R. (Rep. I, 142)—This has been referred to *Phoxopteris comptana* Fröhl., and while the two very closely resemble each other, Prof. Fernald informs me that he yet believes *fragariæ* to be distinct.

TORTRIX CINDERELLA Riley (Rep. W. p. 47).—From specimens rared from cranberry-feeding larvæ received from Mr. Jno. H. Brakeley, of Bordentown, N. J., I am satisfied that this is the same species briefly characterized by Packard in the 1st edition of his *Guide* (p. 334) as *Tortrix oxycoccana*, and that *T. malivorana* LeBaron (my Rep. IV, p. 47) is but a dimorphic orange form, subsequently described by Packard as *T. vacciniivorana* (Hayden's Report of the U. S. Geol. and Geogr. Survey of the Territories 1878, p. 522). The orange and ash-gray specimens are thus bred both from Apple and Cranberry. I have reared both forms from Cranberry and from Apple, and they are undistinguishable in the larva and pupa states. The gray form is often more or less suffused with orange scales and the orange form less frequently with gray scales. This is the most remarkable case of dimorphism with which I am familiar in the family, and points strongly to the important bearing of biological facts on a true classification. The dimorphic coloring is not sexual, but occurs

in both sexes. The eggs of this species are very flat, circular and translucent, with a diameter of 0.7^{mm}, and are laid singly on the underside of the leaf near the mid rib. The species belongs to the genus *Teras*, and as Packard's specific name *oxycoccana* has priority, the insect should be known as *Teras oxycoccana*, Pack. The insect, according to Mr. Brakeley, who gives an account of it in the Report of the Seventh Annual Convention of the New Jersey Cranberry Association (1879, p. 7), commonly affects, also, the high-bush whortleberry. The gray form of the moth is most frequent in autumn.

ŒTA COMPTA, Clem. (Rep. I, p. 151).—Notwithstanding Mr. Grote doubts the identity of this insect with Cramer's *Phalæna punctella*, there is no question in my mind about it and I entirely agree with Zeller, who makes also the *Tinea pustulella* Fabr. a synonym. (Beitr. z. Kenntn. N. A. Nachfalter II, p. 28). It was first described in this country in 1856 by Fitch as *Deiopeia aurea* (3rd Rep. Ins. N. Y., p. 168). See also "Zygænidæ and Bombycidæ of N. A.," by R. H. Stretch, 1872, pp. 159 and 241.

The egg of this insect is one of the most singular Lepidopterous eggs with which I am familiar. I have found it numerously in the South in midsummer. It is 0.9^{mm} long, soft and plastic so as to be variable in form; but when laid (as it often is) on the web which the young larvæ make, where it takes on the more natural form, it is ovoid, somewhat compressed, with frequently a median ridge and one end narrowed and produced into a short neck. The color is cream-yellow and the delicate shell is corruguate. It is laid singly and generally slightly attached by the broad side to the side of the mid-rib of the tenderest leaves, and its contact (by virtue, doubtless, of some poisonous liquid with which it is laid) causes a well defined swelling of the leaf-vein.

The species is placed among the *Zygænidæ* in Grote and Robinson's *List*, and has evidently more affinities therewith than with the *Teneidæ*.

SOME NEW VARIETIES OF CATOCALÆ.

By G. H. French, Carbondale, Ill.

Besides the varieties named by Mr. Hy. Edwards in his excellent paper in Vol. 3 of the Brooklyn Bulletin, it seems to me the following are not only sufficiently separate in their markings from the usual forms, but also constant enough to warrant giving them varietal names, and I therefore propose the following:

CAT. LACHRYMOSA, Guen.

Var. Evelina, n. var.

This form is the opposite of var. *Paulina*, Hy. Edw. The basal third of the primaries, the whole of the posterior or inner margin, and the terminal space, is suffused with deep brownish

black. This is broken in the middle of the terminal space, this dash and the rest of the wing being of the usual color. Described from 3 specimens.

CAT. LACHRYMOSA, Guen.

Var. *Zelica n. var.*

This form bears the same relation to the usual form that var. *Phalanga*, Grote, does to *Cat. Palæogama*, Guen. The space between the t. p. and the subterminal lines, and a shade inside the t. a. line, deep brown black. The rest of the wing is no darker than many of the ordinary forms. Described from 3 specimens.

CAT. INNUBENS, Guen.

Var. *Hinda, n. var.*

I would apply this name to that form in which the primaries are marked with deep brown from the base to the apex, usually suffusing the costal half of the wing except the pale apical patch. This patch and the posterior part of the wing are lighter than in the ordinary form. Rather more than half of those taken here are of this form.

AN ANNOTATED CATALOGUE OF THE DIURNAL LEPIDOPTERA OF THE ISLAND OF CUBA.

(BASED ON KIRBY'S SYNONYMICAL CATALOGUE.)

By SENOR DON JUAN GUNDLACH.

FAMILY I.—NYMPHALIDÆ.

SUB-FAMILY I.—DANAINÆ.

Genus 3. DANAIS. Latr.
27. *D. Erippus.* Cr.
27 a. *D. Gilippus.* Cr.

Kirby considers these two species as varieties, or one species in transition, but this is not certain. Not only the perfect insect is differently colored, but also the caterpillars are very different.

Genus 7. LYCOREA. Dbly.
2. *L. Ceres, var Dimeter.* Feld.

Genus 22. ITHOMIA. Hbn.
140. *I. Cubana.* H. Sch.

SUB-FAMILY II.—SATYRINÆ.

Genus 46. CALISTO. Hbn.
2. *C. Herophile.* Hbn.

SUB-FAMILY VII.—HELICONINÆ.

Genus 1. HELICONIUS. Latr.
46. *H. Charithonia.* L.

Genus 2. EUEIDES. Hubn.
13. *E. Cleobæa.* Hb. Zutr.

SUB-FAMILY VIII. NYMPHALINÆ.

Genus 1. COLAENIS. Hbn.
6. *C. Delila.* F.

Genus 2. DIONE. Hubn.
3. *D. Vanillæ.* L.

Genus 4. CLOTHILDA. Blanch.
1. *C. Pantherata.* Mart.
1 a. *C. Numida.* Hbn.
4. *C. Cubana.* Salv.

Genus 11. EUPTOIETA. Dbly.
2. *E. Hegesia.* Cr.

Genus 14. PHYCIODES. Hbn.
19. *P. Frisia.* Poey.
41. *P. Pelops.* Drury.

Kirby mentions also *Anocaona* (*Anacaona* Poey), but this name is a synonym of *Pelops.* Dr.

Genus 17. COATLANTONA. Kirby.
16. *C. Perezi.*(Gundl.) H. Sch.

Genus 21. HYPANARTIA. Hbn.
6. *H. Paullus.* F.

Genus 23. PYRAMEIS. Hbn.
1. *P. Atalanta,* L.
8. *P. Cardui.* L.
9. *P. Virginiensis.* Dr.

Genus 24. JUNONIA. Hbn.
12. *J. Lavinia.* Cr.
= *Zonalis.* Feld.
12 b. *J Genoveva.* Cr.

Genus 29. ANARTIA. Hbn.
1. *A. Jatrophæ.* L.
2. *A Lytrea.* Godt.

Genus 36. EUNICA. Hubn.
1. *E. Tatila.* H. Sch.
38. *E. Monima.* Cr.
53. *E Heraclitus.*

In Kirby's catalogue this sp. is referred to Poey, but Poey does not mention it in *loco citado.* The author is Eschscholz.

Genus 43. DYNAMINE. Hubn.
23. *D. Egæa.* F.
27. *D. Mylitta.* Cr.
Genus 52. GYNÆCIA. Doubl.
1. *G. Dirce.* L.
Genus 59. LUCINIA. Hubn.
2. *L. Sida.* Hubn.
Genus 63. MEGALURA. Blanch.
4. *M. Chiron.* F.
(18. *M. Poeyi.* Lucas.)
This is a synonym of *Anæa Echemus* Doub, and should be omitted from the list of the species of this genus.
20. *M Eleucha.* Hubn.
Genus 64. VICTORINA. Blanch.
1. *V. Steneles.* L.
Genus 65. HYPOLIMNAS. Hubn.
1. *H. Bolina.* L.
Kirby does not indicate America. All the localities mentioned are in the other hemisphere.
Genus 76. ADELPHA. Hubn.
6. *A. Basilea.* Cr.
Genus 93. APATURA. F.
31. *A. Druryi.* Hbn.
33. *A. Idyja.* Hbn.
Genus 98. AGANISTHOS. Bdv.
1. *A. Odius.* F.
2. *A. Acheronta.* F.
Genus 99. PREPONA. Bdv.
12. *P. Antimache.* Hbn.
Genus 109. HYPNA. Hubn.
1. *H. Clytemnestra.* Cr.
var. Iphigenia. H. Sch.
Genus 110. ANÆA. Hubn.
2. *A. Troglodyta.* F.
5. *A. Echemus.* Dby.
See note on Genus Megalura.
Genus 111. SIDERONE.
1. *S. Ide.* Hubn.

FAMILY II.—LEMONIID
SUB-FAMILY I.—LIBYTHÆINÆ

Genus 1. LIBYTHÆA. F.
L. Terena. Godt.

FAMILY III.—LYCÆNIDÆ.

Genus 10. CUPIDO. Schrank.
65. *C. Isopthalma.* H. Sch.
67. *C. Hanno.* Stoll.
68. *C. Ammon.* Lucas.
69. *C. Cassius.* Cr.
Genus 13. THECLA. F.
228. *T. Celida.* Lucas.
302. *T. Martialis.* H. Sch.
305. *T. Simæthis.* Dr.
306. *T. Mæsites.* H. Sch.
347. *T. Coelebs,* H. Sch.
373. *T. Limenia.* Hew.
(Suppl.) 407. *T. Angelia.* Hew.
(") 441. *T. Cybira.* Hew.
Genus 38. EUMÆUS. Hubn.
3. *E. Atala.* Poey.

FAMILY IV.—PAPILIONIDÆ.
SUB-FAMILY I.—PIERINÆ.

Genus 5. DISMORPHIA. Hubn.
26. *D. Spio.* Godt., *var. Cubana.* H.Sc
Genus 10. EUREMA. Hubn.
1. *E. Nicippe.* Cr.
2. *E. Proterpia.* F.
4. *E. Gundlachia.* Poey.
33. *E. Lisa.* Bdv.
36. *E. Palmyra.* Poey.
39. *E. Elathea.* Cr. (?)
43. *E. Conjungens.* H. Sch.
44. *E. Jucunda.* Bois.
=. *Ebriola.* Poey.
=. ♀. *Albina.* Poey.
46. *E. Dina.* Poey.
50. *E. Larœ.* (Gundl.) H. Sch.
51. *E. Citrina.* Poey.
54. *E. Messalina,* F.
55. *E. Gnathene,* Bdv.

Kirby gives the last two numbers as distinct species, but they form but one, and *Bulœa,* Bois, is a synonym of the same. I have noted them as follows in my collection :
Terias *Messalina.* Fab. Mant. (1787) Kby, P. 445.
" *Gnathene.* Bdv. Spec. 46 (1836). Kby, P. 445
" *Bulœa.* Bdv. Spec. 47 (1836). Kby, P. 446.
" *Arabella.* Hbn. Zutr. 1837.
" *Iradia.* Poey. Mem. Cuba, 1831.
The whole of these five names are referable to one species.
56. *E. Lucina.* Poey.
56 a. *E. Fornsi.* Poey.
56 b. *E. Cubana.* H. Sch.
(57. *E. Bulœa.* Bdv.)
See note on *E. Messalina,* above.
65. *E. Amelia.* Poey.
Genus 11. PIERIS. Schrank,
87. *P. Monuste.* L.
Genus 11 b. DAPTONOURA. Butl.
6. *D. Salacia.* Godt.
10. *D. Ilaire.* Godt.
Genus 15. CATOPSILIA. Hbn.
6. *C. Eubule.* L.
12. *C. Thalestris.* Hubn.
Kirby appears to believe that *C. Thalestris* and *C. Avellaneda* are but little different. On the upper surface they have some resemblance, principally in the ♀, but the lower surfaces are entirely unlike.
12 a. *C. Avellaneda.* H. Sch.
14. *C. Argante.* F.
C. Agarithe. Bdv.
On page 484 Kirby's Catalogue the last named is given as a variety of *C. Argante.* But there is a very great difference on the under side of the upper

wings, the oblique brown band being always broken in *Argante* and entire in *Agarithe*. The ♀ ♀ differ more than the ♂ ♂.

20. *C. Statira*. Cr.
21. *C. Neleis*. Bdv.
24. *C. Godartiana*. Swain.

Genus 16. KRICOGONIA. Reak.
1. *K. Lyside*. Godt.

Genus 17. GONEPTERYX. Leach.
2. *G Mærula*. F.

Genus 19. MEGANOSTOMA. Reak.
1. *M. Cesonia*. Stoll.

Genus 25. NATHALIS. Bdv.
1. *N. Iole*. Bdv.

SUB-FAMILY II.—PAPILIONINÆ.

Genus 21. PAPILIO. L.
19. *P. Villersii*. Godt.
25. *P. Polydamas*. L.
120. *P. Gundlachianus*. Feld.
147. *P. Androgeus*. Cr.
155. *P. Thoas*. L.
Var. *Cresphontes*. Cr.
Var. *Oviedo*. Gundl.
158. *P. Cresphontinus*. Mart.
161. *P. Andræmon*. Hbn.
162. *P. Caiguanabus*. Poey.
163. *P. Oxynius*. Hubn.
164. *P. Pelaus*. F.
268. *P. Celadon*. Lucas.
325. *P. Polyxenes*. F.

FAMILY V.—HESPERIDÆ.

Genus 1. THYMELE. F.
23. *T. Santiago*. Lucas.
24. *T. Marmorea*. H. Sch.
27. *T. Proteus*. L.
48. *T. Vespasius*. F.
Var. *Cassander*. F.

In a letter to me, Mr. Hoppfer states that Herrich Schæffer has named my No. 357 *Achylodes Cassander*. F. Now, *Cassander* in H. Sch. is a *Goniloba*, and *Gesta* is a *Nisoniades*. But the question remains: Is my 357 = *Vespasius*. F?

Genus 2. TELEGONUS. Hubn.
2. *T. Talus*. Cr.
17. *T. Xagua*. Lucas.
23. *T. Habana*. Lucas.
32. *T. Maysi*. Lucas.
33. *T. San Antonio*. Lucas.

Genus 17. ERYCIDES. Hubn.
27. *E. Batabano*. Lucas.

Genus 18. CARYSTUS. Hubn.
9. *C Tripunctus*. H. Sch.
49. *C. Corydon*. F.

Genus 19. PROTEIDES. Hubn.
7. *P. Cunaxa*. Hew.

I believe that *P. Alameda*, Lefeb, is = ♂ of *P. Mesogramma*, Poey. If so, the name of the sp. should stand as *Alameda*, because the *Mesogramma*, Poey, is not the anterior *Mesogramma*. Latr. (fide Kirby) and the name *Cunaxa* Hew, is posterior to *Alameda*.

8. *P. Antiqua*. H. Sch.
19. *P. Corrupta*. H. Sch.

Genus 20. PAMPHILA. F.
1. *P. Ethlius*. Cr.
26. *P. Sandarac*. H. Sch.
65. *P. Sylvicola*. H. Sch.
66 a. *P. Coscinia*. H. Sch.
78. *P. Phylæus*. Dr.
81. *P. Radians*. Lucas.
82. *P. Amadis*. H. Sch.

I believe that *P. Baracoa*, Lefeb. and *P. Amadis*, H. Sch., are synonyms. The name *Baracoa* is anterior.

83. *P. Magdalia*. H. Sch.
84. *P. Mayo*. H. Sch.

Pamph. Misera, Luc. (Lefeb.) and *P. Mayo*, H. Sch., are one species, the name *Misera* being anterior. *Misera* is the ♂, *Mayo* the ♀.

145. *P. Malitiosa*. H. Sch.
157. *P. Philemon*. F.

I believe with Herrich Schæffer that the following names are synonyms, and represent the ♂, viz.:

Philemon, F., 1775.
Flyas, Cr., 1782.
Velasquez, Lefeb., 1856.

but Kirby adds the name *Arcas*. Dr. 1773, which is preferable, being anterior.

165. *P. Cubana*. H. Sch.
166. *P. Singularis*. H. Sch.
168. *P. Cornelius*. Latr.
170. *P. Amyntas*. F.
175. *P. Alameda*. Luc.
See remarks on *P. Cuxana*. (ante.)
179. *P. Baracoa*. Luc.
See remarks on *P. Amadis*. (ante.)
211. *P. Misera*. Lucas.
See remarks on *P. Mayo*. (ante.)

Genus 23. THYMELICUS. Hubn.
10. *T. Nanus*. H. Sch.

Genus 24. HESPERIA. F.
40. *H. Syricthus*. F.
40. *H. Crisis*. H. Sch.

Genus 44. NISONIADES. Hubn.
13. *N. Zarucco*. Lucas.
14. *N. Potrillo*. Lucas.
15. *N. Braco*. H. Sch.
16. *N. Undulatus*. H. Sch.
17. *N. Brunnea*. H. Sch.
18. *N. Concolor*. H. Sch.
32. *N. Otreus*. Cr.
33. *N. Zephodes*. Cr.

The ♀ of *Arcas* = *Philemon F.*, etc., is the *Otreus* Cr. (1782), which is = *Zephodes*, Hubn. We have observed

these frequently in copula. *N. Brunnea* H. Sch., is very near to this, but properly separated by its author. I note in my collection several differences which prove their distinctness.

Genus 45. ACHYLODES. Hbn.

4. *A. Gesti.* H. Sch.
See note on P, *Vespasius.* (ante.)
5. *A. Papinianus.* Poey.
18. *A. Velasquez.* Lucas.
26. *A. Arcas.* Dury.
See note on *P. Philemon* (ante.)

In a letter to Mr. Henry Edwards, dated May 13th, 1881, Señor Gundlach says;

"The work of Sagra (part Lepidoptera,) mentions many species never found by Poey and myself in Cuba. You will read what M. Guerin and Sr. Sagra say in the introduction to the Spanish edition (I do not know if their remarks are also found in the French edition,) on the collection brought from Cuba, and mixed by M. Lefebvre with the Lepidoptera of the Antilles in general. When Mr. Lucas began to work upon them he found no indication that a species was surely from Cuba, and in this uncertainty, he has enumerated a great number of species never discovered in the Island." Sr. Gundlach adds the following valuable information on the species of Diurnal Lepidopt. mentioned in Sagra's work.

Apatura Theodora. Lefeb. = *A Pavonii*, Latr. Not observed by me.

Thecla Marius. Bdv. ined. Not observed by me, or perhaps = *T. Limenia.* Hew.

Thecla Pasco. Lefeb. Not observed by me.
" *Aon,* Lefeb. " " " "

The. *T. Aon.* Lefeb. (?) by H. Sch. Corrb. 1864, p. 165, is not the *T. Aon*, typus, but

T. Celida. Bdv. ined, in Sagra.

Thecla Celida. Bdv. ined. is my 119. = *Th. Aon.* Lefeb. ? of H. Sch.

Thecla Tollus. Bdv. ined. Not observed by me, or perhaps my No. 116, which is = *T. martialis.* H. Sch.

Lycæna Theonus. Lefeb. is in Kirby's Catalogue the same as *L. Amnon*, but it is *Ly. Cassius.*

Lycæna Astinida. Bdv. ined. not observed by me. Lucas, in the Spanish edition, says *Astinida, not Astinidas.*

Eudamus Sumadus. Lefeb.
" *Trinidad.* Lefeb.

I have not observed these two species, nor have I seen *Endamus Capucinus.* Lefeb. unless it be *Telegonus San Antonio* Lucas.

Telegonus Xagua. Lucas. (Kirby, page 573, No. 17) should be *T. Jaqua.*

Nisoniadas Potrillo. Lefeb. (Kirby Page. 629, No. 14).
The name of the mountain is Potrerillo, not Potrillo.

Nisoniades Zarucco. Lefeb. is named from the town Jaruco, not *Zarucco.*

Kirby indicates as species of Cuba on page 607, No. 203, and p. 608, No. 223, the two following species:

Hesperia Labeo. Poey. cent. Lep. 1833, and Sagra, 1857.

" *Ulpianus.* Poey. cent. Lep. 1833, and Sagra, 1857.

but Poey does not indicate the country as Cuba. For *Labeo* he says "Elle habite * * *" and for *Ulpianus*, "Brezil."

P. Utha. Hew. descrip. Hesp. 1868, page 37, Cuba.

P. Palæa. Hew. l. c. page, 31, Cuba.

I do not know these species.

Thanaos Paterculus. H. Sch. Corrbl. 1863. (Kirby, p. 629, No. 12.)

"Herrich Schæffer does not mention this species in 1864 in his Catalogue of the Lepidoptera of Cuba."

DESCRIPTIONS OF SOME NEW SPECIES OF HETEROCERA.

By Henry Edwards.

FAM. SPHINGIDÆ.

SPHINX LIBOCEDRUS. n. sp.

At first sight looking like a small example of *Sph. Oreodaphne*, but differing greatly when carefully examined. Color the same as that of *Sph. Chersis*, with the same black dashes upon the primaries, that along the median nervule, which is frequently wanting in *Oreodaphne*, and sometimes in *Chersis*, being here well defined and reaching almost to the base of the wing. The ground color of the secondaries is a clearer white, and the median black band stands out in stronger contrast than in either *Chersis* or *Oreodaphne*, while the grey dorsal space of the abdomen, traversed by a black line, is narrower than either of the other forms, and the demi-band comparatively larger, and clearer white. In *Chersis* and *Oreodaphne*, the thorax has the tegulæ edged inwardly with black, in the form of a long triangle. In *Libocedrus*, this mark is present, and in addition, the tegulæ themselves have a distinct black streak, reaching to the base of the head, not observable in either of the others. The under side of the wings is paler grey, with the median band of the secondaries very strongly marked.

Exp. wings. 2.50 inch.

1 ♂. Prescott, Arizona. (W. Howard.)

Type. Coll, Hy. Edwards.

SPHINX UTAHENSIS. n. var.

In the collection of Mr. B. Neumoegen, are two examples of a Sphinx, allied to *Sph. drupiferarum*, but if a variety of that

species, it possesses characters, apart from its great size, to which attention may be called. It is altogether of a greyer cast, without any of the pinkish yellow tint seen in *drupiferarum*. The primaries preserve the resemblance to the well known species, the median band of secondaries is much broader, straight, and not waved on its outer edge. It terminates also on the costa nearer to the base than in *drupiferarum*. The abdomen is a darker grey, and the white demi-bands are reduced to small oblong blotches. The example is a ♀.

Exp. wings. 4.50 inch.

S. Utah.

The average size of six examples ♂. ♀. of *Drupiferarum*, in my collection, does not exceed 3.60 inch.

FAM. ZYGÆNIDÆ.

ANATOLMIS FULGENS. n. sp.

Size of *A. Grotei, Pkd.*, but differing from that species by the primaries being of a bright crimson tint, without the slightly orange shade observable in the well known species. The secondaries are wholly black, with the exception of a very narrow costal streak, rosy red. The thorax also is black, with only the anterior edge of tegulæ crimson, while in *A. Grotei* the thorax is wholly yellowish crimson. Underside same as the upper.

1 ♂ Prescott, Arizona. (W. Howard.)

Type. Coll. Hy. Edwards.

FAM. BOMBYCIDÆ.

THYRIDOPTERYX MEADII. n. sp.

A singular little species, differing from *T. ephemeriformis* in the more slender body form, the less hairy body clothing, and the whiter and clearer wings. The nervules are pale orange, instead of brown, and there is no trace of the hairy clothing of the abdominal margin of secondaries so observable in *Ephemeriformis*. The wings are narrower in proportion, and want the shining gloss of the well known species. The larval case is much more cylindrical than that of its congener, being nearly of equal breadth throughout. In other words, it is not swollen in the middle, and is much smaller than the average size of *Ephemeriformis*.

Exp. wings, 1.00 inch. Length larval case, 1.25 inch.

1 ♂ Mohave Desert, California. (T. L. Mead.)

Type. Coll. Hy. Edwards.

FAM. NOCTUIDÆ.

ORIBATES VERSUTUS. n. sp.

Size of *O. limbatus*, and resembling it in the form of its

markings, though remarkably different in its coloration. General color, rich golden brown. Basal space, deep brown; subbasal space, deep ochreous, shaded with brownish. T. a. and t. p. lines almost parallel with each other, and enclosing a narrow space, very rich golden brown. The spots are obsolete. Behind the t. p. line the wing is again dark ochreous, shaded heavily with deep brown, and the same purplish tinge. Secondaries blackish, with the fringe paler. Beneath, the whole wings are golden brown, flecked with darker color, and the discal spots prominently marked on both wings. The costa of primaries has three small golden spots.

1 ♀ N. W. Texas. (J. Boll.)
Type. Coll. B. Neumoegen.

ORIBATES OPIPARUS. n. sp.

Fawn drab. Basal region reddish, with some faint blackish waved lines most apparent on costa. T. a. line very broad, nearly straight, blackish brown; beyond this, on costa, a small brownish triangular spot, and a larger one at the costal termination of the almost obsolete t. p. line. Reniform, blackish. Posterior margin and fringes, blackish brown, less conspicuously so at the apex. The insect is elsewhere wholly fawn-color.

Exp. wings, 0.60 inch.

1 ♂ Texas. Type. Coll. E. L. Graef.

NOTE.—I learn, through the kindness of my friends, Mr. A G. Butler and Prof. C. V. Riley, that the generic name *Oribates* has been previously employed in the Class INSECTA as that of a group of Crustacea. I am therefore compelled to change it, and I propose to substitute for it that of *Gyros*. The species described by me will therefore be known as

Gyros Muirii.
" *versutus*.
" *limbatus*.
" *opiparus*.

With the exception of *G. Muirii*, the genus is an extremely homogeneous one, but I am inclined to think that *Muirii* differs in generic characters, and that it ought, perhaps to form the type of another genus. The proper position of the group is, I think, near to *Eustrotia*. Hbn.

CATOCALA EMILIA. n. var.

A remarkable form of *C. Lachrymosa*, in which the whole of the base, the half of the internal margin, and the apex of the primaries are dull black, leaving only the middle third of the costal space to a point below the median nerve, and a streak

along the posterior margin, grayish olive. The lines are indistinctly seen, and the reniform is almost obsolete.

1 ♂ Newburgh, N. Y. (Miss Emily L. Morton.)

CATOCALA MIRANDA. n. sp.

Allied to *C. Levettei*, Grote, and probably confounded with it in collections. It is, however, smaller, with the primaries of a clearer grey, and with the lines sharper and more distinct. The t. a. line is oblique, and very slightly dentated, reaching the internal margin at a point very near the middle, and almost connected there with the t. p.. line, which runs into a long tooth on the lower sub-median nervule. The reniform is well defined, gray surrounded by a whitish cloud. Secondaries black, with the fringes clear white, thus presenting a strong point of difference from *C. Levettei.* The thorax has the collar brown, and well marked. Underside smoky brown, with the apices, a sub-marginal band on the primaries as well as the fringe of secondaries white.

Exp. wings. 1.75 inch.
Washington, D. C.
Type. Coll. Hy. Edwards.

This interesting species was presented to me by Mr. A. Koebele, who saw two other examples in the collection of Mr. H. Schönburn. With the exception of *C. tristis*, Edw. this is the smallest of the gray and black group known to me.

SYNEDA OCCULTA. n. sp.

Allied to S. *graphica.* Hubn., but differing in its darker color, and the arrangement of markings of the secondaries. The primaries have the brownish shade of *S. adumbrata*, Behr., and are very similar to that species. They want the stone colored shade of *graphica*, and the whole of the lines and shading is much heavier. The t. a. line is much more regular, not toothed, but slightly angled in the middle, and very heavily shaded posteriorly with brown-black. The t. p. line is also nearly straight in its outline, very slightly sinuate inwardly about the centre, leaving the median space about equal width on the costal and internal margins. It is edged anteriorly with yellowish brown. The suboblong pale patch beyond the t. p. line is nearly the same shape as in *adumbrata*, and not so long as in *graphica.* It has a deep obtuse tooth outwardly, where it is bordered with dark brown, and joins the t. p. line at the median nervule. The submarginal space is deep fawn-drab, and the fringe is the same color. Secondaries rather dull orange, a darker shade than in *graphica*, and not so vivid as in *adumbrata.* The base is wholly clouded with brownish, giving it a dull appearance. From the middle of costa down to the anal angle, runs a rather broad, dusky, black band

almost straight, and from the middle of this runs a branch of equal width, to near the apex, thus forming a distinct Y. The marginal border is rather broad, slightly sinuate, and the fringe is whitish, clouded with dusky. Beneath, the general ground color is dull yellow. Costal edge of primaries, a large inverted wedge-shaped discal spot, a submarginal band, broad on costa, and narrowing to a line on the internal margin, and the moderately wide posterior margin, all black. Secondaries, with basal third of costa, a sub-oblong discal spot, a broad, waved and dentated median band, and the apical half of margin black. These marks are all separate and independent of each other. Thorax, abdomen and legs greyish brown, flecked with white; the abdomen yellowish at the tip.

Exp. wings, 1.60 inch. 1 ♀ Texas. (J. Boll.)
Type. Coll. B. Neumoegen.

SYNEDA FACETA. n. sp.

Primaries dull stone drab, with slightly leaden tint. Basal line almost obsolete, reduced to a few brownish scales. T. a. line rounded inwardly in the middle, forming a rather deep sinus, edged with brown. T. p. line begins on costa, at a space about three lines from the apex, and encloses the usual pale dentated spot. It is furnished with two teeth, directed posteriorly, and when it reaches the median nervule turns abruptly and directly to the middle of the wing below the reniform, and here forms a deep tooth; thence it runs obliquely, but without any deflection or dentation, direct to the internal margin. The median space thus enclosed by the t. a. and t. p. lines is much larger than usual, and is remarkably wide on the costal margin. Behind the t. p. line is a row of seven pale grey spots, being the broken-up sub-marginal line. The t. p. line itself is bright golden brown. Margin and fringes concolorous. The whole surface of the wing is flecked with blackish scales. Secondaries deep orange; the basal half of costa broadly black; apical half of posterior margin also broadly black. Near the apex, a longitudinal black band, interrupted near median nervule, leaving the centre of the wing orange. In a line with this, resting on anal angle, is another longitudinal black dash. Abdominal margins broadly shaded with black. Beneath, the ground color is sordid white. Middle of primaries, dusky black—this shade joined at internal margin to the sub-marginal band, which, with the posterior margin, is also dusky black. Secondaries, with a rosy shade along the abdominal margin, the markings of the upper side being strongly repeated. Thorax, abdomen and legs, greyish brown, flecked with black.

Exp. wings, 1.40 inch.
1 ♂ Indian River, Florida.

SYNEDOIDA VALENS. n. sp.

General color, stone drab, as in most species of the genus.

Basal and median spaces slightly flecked with whitish scales. Basal line rich brown, not reaching to the internal margin. T. a. line even, not dentate, but bent in a nearly right angle in the middle, the apex of angle directed posteriorly. This line is shaded rather heavily with brown at its centre. T. p. line runs from costa very obliquely to the 2nd sub-costal nervule, where it runs into a sharp point, turns abruptly back, forming a deep tooth, the other angle of which rests on the median nervule. Then a small truncate space, slightly dentate, and another indentation almost back to the median nervule, and near to the centre of the wing. The line then passes with a slight deflection, obliquely to the internal margin. This line is very broadly edged with deep brown, especially on the indentations. The space enclosed by the t. p. and t. a. lines bears a fanciful resemblance to a sculptured head, cut off above the forehead, the brownish, oblong reniform appearing as the eye. The sub-marginal line is a little paler than the ground color, and there are seven black dots on the margin at the termination of the nervules. Secondaries without any marks whatever. Underside, stone drab, flecked with blackish scales, a little yellowish on the costa of both wings. Thorax and abdomen concolorous.

Exp. wings. 1.80 inch.
1 ♂. Kanab, S. Utah.
Type. Coll. B. Neumoegen.

FAM. GEOMETRIDÆ.

GORYTODES PERSONARIA. n. sp.

Closely allied to *G. uncanaria* Pack., but differing from that species by the peculiar markings of the primaries. The brownish median space is much narrower on the costa, and does not reach so far towards the apex as in *uncanaria*. It is far less acutely toothed at the beginning of the anterior line, there being in the present species only a simple tooth at the middle, *i. e.* on the median nervule. The posterior line is, however, more decidedly dentate, having throughout its length three distinct teeth. The sub-marginal line is heavier than in *uncanaria*, and is more sinuate. The primaries are less falcate than in the common species. Beneath, the whole surface is free from markings, being almost concolorous, with fleckings of brownish scales on a gray ground.

Exp. wings. 1.25 inch.
1 ♂ Summit, Sierra Nevada, Cal. (H. E.)
I have little doubt that this species exists in many collections

as *G. uncanaria*, but it needs only a comparison to separate them.

ZERENE ELEGANTARIA. n. sp.

The ground of the wings is clear white, with a glossy surface. The anterior and posterior lines are pale orange bordered with a series of black sub-ovate spots on each side, between the nervules. The anterior line is somewhat similar, and the yellow streak runs along the costa to the base of the wing. The posterior line is rather straight on costa, to the 2nd sub-costal nervule. Thence it runs obliquely to the centre of the wing at the sub-median nervule, and then almost straight to the internal margin. In the median space, and reaching to the costa, indicating the central discal spot, is a circular mark of pale orange, edged with black spots as in the lines, and with the centre white, surrounded by black spots. The marginal intronervular spaces have a series of black crescents, and on the margin of secondaries is a faint row of more linear marks, while the costal margin exhibits some indistinct black blotches.

On the underside, the markings are faintly repeated.

2 ♂. 1 ♀. Tucson, Arizona. (R. H. Stretch.)

Exp. wings. 1.20 inch.

Type. Coll. Hy. Edwards.

At the suggestion of my friend, Mr. A. R. Grote, I place this exquisite insect near to the well-known *Z. Catenaria*, but it may herafter prove the type of a new genus. In its system of coloration, it somewhat recalls the very dissimilar *Abraxas grossulariata*. L. of Europe.

AZELINA MORRISONARIA. n. sp.

Under this name I call attention to a very remarkable form of this genus, taken by Mr. Morrison in Washington Territory. It differs very widely from any example I have ever seen of *A Hubneraria*, Gne., and though I know well the tendency of that species to strongly marked varieties, I cannot but think that the present form is distinct. The ground color is a decidedly ochreous tint, particularly so on the posterior margins, and the bands stand out in very strong relief. The anterior line is deeply toothed nearer to the costa than in *A. Hubneraria*, and becomes obsolete before reaching the internal margin, while the posterior line is decidedly straighter, or less sinuate than any example of *Hubneraria* I have examined. The irrorations over the surface of the wings are, in consequence of the paler ground color, much more distinct than usual, as is also the oblique band of the secondaries.

Under side similar to *Hubneraria*.

1 ♂. Washington Territory, (H. K. Morrison.)

Type. Coll. B. Neumoegen.

CORRECTIONS.

In my paper in PAPILIO No. 5, on Species of Nisoniades, the following corrections are to be made.

On page 70, last line, for spot's read spots.

On page 72, line 4, transfer "in the Middle and Eastern States," to end of line 22.

On page 73, line 4, *cæspitabis* (an error for *cæspitalis* of the MS.) read *cæspitatis*, and *dele* foot-note of the page. In giving the correction to the Edwards' Catalogue, I had followed Boisduval's *Lep. de. la Californie* (1869), Edwards' Synopsis (1872), Morris (1860 and 1862), Scudder, Kirby, *et al.* Mr. W. H. Edwards has subsequently informed me that he finds the species to have been originally published by Dr. Boisduval in the *Ann. Soc. Ent. Fr.*, in 1852, as *cæspitatis*. As there appears to be no necessity for the terminal change to *alis* made by Dr. Morris in the Smithsonian publications in 1860 and 1862, by the author himself in 1869, and adopted by subsequent writers, the name as originally given, will have to be retained.

J. A. LINTNER.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] September, 1881. [No. 8.

REPORT OF THE PROCEEDINGS WITH REFERENCE TO "LEPIDOPTERA," OF THE ENTOMOLOGICAL SECTION OF THE AMERICAN ASSOCIATION FOR ADVANCEMENT OF SCIENCE.

The Entomological Sub-section of the American Association met at Cincinnati, on 18th, 19th and 20th of August, 1881. There were present Rev'd Dr. Jno. G. Morris, Chairman; B. P. Mann, Secretary; Prof. A. J. Cook, Prof. S. H. Peabody, Dr. H. S. Jewett, Chas. Dury, C. G. Siewers, V. T. Chambers, W. H. Edwards, Prof. J. A. Lintner, Prof. Cyrus Thomas, J. Duncan Putnam, Prof. C. V. Riley and others.

The first paper on Thursday, 18th, was read by Mr. Edwards, giving an account of the peculiar habit of Heliconia *Charitonia*, Linn, as observed and communicated by Dr. Wm. Wittfield, of Indian River, Fla. In two instances a group of the butterflies of this species, three or four in number, were found clinging by their legs firmly to a chrysalis of the same species, and they remained there, resisting attempts to frighten them away, for two days or more, until the imago issued from the chrysalis, when the butterflies departed.

This relation elicited much interest and was discussed by several of the members. Some thought the gathering of the butterflies might be caused by sexual desire, the imago being perhaps of the opposite sex from the butterflies. Others thought that the butterflies, knowing well their own immunity from attacks of birds or animals, by reason of obnoxious fluids or smell, had come to discover that their presence protected from attack the naked and defenceless chrysalis, at a time when protection was most needed, namely, just before the issuing of the imago.

The other papers read related to other branches of Entomology than the Lepidoptera, and therefore are not reported for PAPILIO.

Mr. Edwards exhibited a box of butterflies, embracing Limenitis *Arthemis*, called by Mr. Scudder in his recent book, "Butterflies" 1881, the White-banded Purple, and *L. Ursula*, called the Red-spotted Purple, and requested an opinion from the members as to the color of these insects. The group is called "Purples" by Mr. Scudder. The members were unanimous that the specimens were black or brown-black, and not purple. One gentleman thought he discovered a purple flush to *Arthemis* when looked at sidewise, but was of the same opinion as the rest as to the ground color. It was agreed that the name was a misnomer.

On Friday, Mr. Edwards read a paper on the Length of Life of Butterflies, showing from his own notes made during a period of 15 years, last past, that with the summer butterflies the duration of life was measured by weeks, depending on the period when copulation took place in the male and oviposition in the female, shortly after which events the sexes expired. A butterfly three weeks old was aged, and if any lived longer they were the males who had been unable to find mates. As to the hibernating butterflies, the history of Danais *Archippus* was related in full from special observations made, and it was shown that the duration of life could at most be from September to about first of June of the following year, and that the first eggs of the year were laid by the hibernating females, who at once disappeared after finishing their laying. That the broods of this species followed in quick succession to the number of three or four at least, and that the eggs were laid by young females, but a short time from chrysalis. This was directly opposed to the statements of Mr. Scudder, first set forth in Psyche in 1875, and recently in "Butterflies," 1881, that *Archippus* lived from 12 to 15 months; laid no eggs till after hibernation, and then laid all along through the summer, so that the caterpillars formed during the summer were from these eggs only. In fact that this species had changed its habits from that of its kind, and bred much after the fashion of a mammal.

After this paper Prof. Lintner read one on the Life Duration of the Heterocera, in which he gave the result of his own experience—15 days to 3 weeks as the limit of life of the imago. Mr. Lintner suggested that good service might be rendered science by the collation of published records, and the publication of data respecting appearance of species of insects.

This paper was followed by a discussion of the whole subject by members. Dr. Jewett was emphatic as to there being at least three broods of *Archippus* in Ohio, and he had repeatedly

observed that the eggs were laid by females evidently not long from chrysalis.

Prof. Riley related his experience in Missouri and other States. He agreed with Mr. Edwards on the facts in the history of *Archippus*, but also believed that the species did not hibernate at all in the Northern States, but migrated as far to the South as Missouri, or Virginia, returning again in the Spring to the North more or less; and he suggested that this fact might have led Mr. Scudder into such errors as he has published about this species.

In the afternoon session Prof. Lintner read a paper on A Remarkable Invasion of Northern New York by a Pyralid Insect: relating that during May, 1881, St. Lawrence Co., N. Y., was much overrun by a new sort of army worm, causing vast destruction and threatening much more, when they disappeared by going to ground. By obtaining cocoons he ascertained when the moths came out that they were the little species *Crambus Vulgivagellus*, one which had never before been known to be an injurious insect.

Mr. Edwards read a paper on The Alleged Abnormal Peculiarity in the History of Argynnis *Myrina*: showing from careful observation that the history of both Arg. *Myrina* and *Bellona*, as related by Mr. Scudder in the Am. Nat., 1872, and repeated in "Butterflies" is wholly incorrect, and that these species are not at all peculiar, but like other two or three-brooded species in their behavior.

On Saturday, 20th, the papers read were upon other insects than Lepidoptera. In the informal discussion that closed the meeting Prof. Peabody related some observations that led him to believe the life period of certain Heterocera to be very short—scarcely reaching a week.

Mr. Edwards mentioned that Thecla *Henrici* laid its eggs in the wild plum, placing them at the base of the plum stalks, on upper side. That the caterpillars on emerging from the eggs travelled up the stalks and fixed themselves on the young plums, eating out a round cavity the diameter and depth of the head at first, and continuing to feed upon the inner part of the plum, avoiding the seed, growing as the plum grows. They spend most of the time with head and next two segments in the plum, coming out to moult, and changing to another plum when the first one is completely excavated. They hibernate in chrysalis, and the butterfly comes forth in the Spring when the plum trees are beginning to bloom, being a one-brooded species.

The meeting adjourned Saturday noon to meet in 1882 at Montreal.

NOTE ON AGROTIS REPENTIS.

By A. R. Grote.

Having recently added to my books of reference on Entomology a copy of Harris's original report, I went again over the descriptions of the Noctuidæ. The common species first illustrated and described as *Agrotis Repentis* G. & R., Trans. Am. Ent. Soc., Vol. I, Plate VII, I had since identified, but now I believe incorrectly, with Harris's *Agrotis Messoria*. It was redescribed as *Agrotis Cochrani*, by Prof. C. V. Riley, when accounts were given of its destructiveness in the Missouri Reports. The moth is found across the continent. Californian specimens are somewhat larger than the Eastern ones, and at first I thought they might belong to a different species. They showed some resemblance to Herrich-Schaeffer's figure of *Lycarum*, to which species I doubtfully referred them. Subsequent collections showed the presence of undoubted *Repentis* in Colorado, and no doubt remains on my mind, that we have to do with a single widely distributed species, and one that is of interest as being injurious to the labors of the agriculturist.

I have not been able to find the species in Harris's collection, in the Cabinet of the Boston Society of Natural History; nor have I seen the type of *Messoria*, but I think it hardly possible that the two can be the same species. Harris's description of his species, in his original Report, p. 324, is as follows:

"The reaping rustic (*Agrotis messoria*) as it may be called, is the representative of the corn rustic (*Agrotis segetum*) of Europe. The fore-wings are reddish gray, crossed by fine wavy blackish bands, the first two of which, and generally the fourth also are double; the two ordinary spots, and a third oval spot near the middle of the wing are bordered with black. The hind wings are whitish, becoming dusky brown behind, and have a small central crescent and the veins dusky. The head and thorax are chinchilla-gray; the collar is edged with black; and the abdomen is light brownish-gray. It expands 1 $^{4}/_{10}$ inch.

From this it is clearly impossible that *Repentis* can be the species. The *reddish-gray* primaries, the *whitish* hind-wings, the *chinchilla-gray* thorax, all point to another species, viz.: *Agrotis scandens*, Riley. I have elsewhere noted the variation of this light-gray species, which has a tint of red, more or less noticeable on the fore-wings. I have collected it in July on the flowers of the milk-weed, near Buffalo. Some specimens have a very high blush of red.

Whether we can refer *Scandens* to this species of Dr. Harris's or not, must, perhaps, be considered uncertain, until Harris's type be found. But we cannot consider *Repentis* as *Messoria* any longer. This species I took with me to Europe in 1867, and

could not identify it in the collection of the British Museum. M. Guenée had received it from Canada in a collection which reached him just before my visit to Chateaudun. In conversation he suggested the name *Repentis* for the species, and I told him that we should call it by this name when we illustrated it.

The correction should be made in my recently published list of our species of *Agrotis*, and the name *Repentis* restored. The description of Dr. Harris is repeated on page 444 of the Third Edition of his Report. Prof. Riley's *Cochranii* should keep the place, to which I have assigned it, as a synonym of *Repentis*.

In my collection are several forms of *Agrotis*, which more or less closely resemble *Repentis*. Among these are *Rubefactalis*, which has the markings and dusky fuscous ground color of *Repentis*, but has a distinct rusty, or reddish shading over thorax and fore-wings. It is from Washington Territory. Then there is *Friabilis*, a small species from Canada, which has the markings quite obliterate. It is colored like *Repentis*, of which it may be a small form or variety. Another species is *Pleuritica*, from Canada, which has the male antennæ more deeply pectinated, but the markings are much like *Repentis*. The color is a little brighter and ochrey. Other species, chiefly from the West, which approach *Repentis*, are: *Balanitis*, *Fuscigera*, *Brunneigera* and *Micronyx*.

Whether *Segetum* is an American species is doubtful as yet. I have described a species, many years ago, as *Texana*, and figured it, which I have thought since might be *Segetum*. My type is probably in Philadelphia, and I have had no second specimen to compare. I have seen what may be the species in a collection from Colorado, sent to me to name by the Rev. Mr. Hulst. It is not improbable that the Texan species and the one from Colorado should be the same, since the two localities have other forms in common. It is also known that in California and Texas there are instances where the same species occur, and at the same time not in the Eastern States. Such examples are *Orthosia Posticata* and *Heliothis Cupes;* while two of the Texan species of *Ammoconia* are found also in Arizona.

In the Missouri Reports I have found that most, if not all, of the new noctuidæ there described as new were, in reality, known to science; and Professor Riley's names must be added to the synonymy of previously described species. They are as follows:

Agrotis Cochranii, Riley is A. REPENTIS G. and R.

Agrotis Scandens, Riley may be A. MESSORIA H.

Acronycta Populi, Riley is A. LEPUSCULINA G.

Prodenia Autumnalis, Riley is LAPHYGMA FRUGIPERDA A. and S.

Xylina Cinerea, Riley is X. ANTENNATA, Walk.

Plusia Brassiæc, Riley may be P. NI. Hubn.

As to this last, it is difficult to believe that the American

form is distinct from the European. Specimens of the two "may be undistinguishable" according to Prof. Riley's subsequent remarks. The characters given to separate the two are those of variation. Again, that the species occurs from Canada to Alabama, and westerly to California, may not have been known or considered. But the principal difficulty in considering the two distinct lies in the fact that, while the species is essentially distinguished by the male abdominal tufts, in this the European and American specimens agree. Like *Pieris*, the moth may have followed commerce. It has of late years been quite abundant on Staten Island.

The above are, I believe, all the new Noctuidæ in the Missouri Reports. Among the identifications of Noctuidæ, in the same Reports, the following are erroneous: *Prodenia Commelinæ* Riley is not Abbot and Smith's species, but *Lineatella* of Harvey. (It is possible that *Flavimedia* and *Lineatella* are sexes of one species.) Again the *Agrotis Jaculifera* of Prof. Riley includes *Agrotis Tricosa* of Prof. Lintner, and, perhaps, *Agrotis Herilis* Grote.

But the value of Reports on Insects injurious to agriculture is hardly affected by incorrect scientific names being used. The main point is, that the species should be clearly described, together with its habits. I have always deprecated the custom of interlarding the text of such Reports with technical discussions on matters connected with synonymy.

NOTES ON SOME NORTH AMERICAN LEPIDOPTERA.

By Arthur G. Butler.

(*Continued from p.* 103.)

In the present part of my paper I shall make a few remarks upon the Bombyces sent to us by Mr. Edwards; these consist of eighteen recognized species.

I commence with the *Cossidæ*, since I feel satisfied that this family, both in the habit of the larva and the complicated neuration of the imago, shows distinct affinities to the typical *Castniidæ*; the form of the wings more nearly approaches the *Sphingidæ* (compare *Morpheis smerintha;* see also Herrich-Schäffer's Auss. Schmett. figs. 150-153, species of the same genus). It is true that the antennæ in some of the genera resemble those of *Lasiocampidæ* or *Notodontidæ*, but this, I take it, is due to reversion to an ancestral character.

I therefore would locate the *Cossidæ* between the Sphinges and Castniæ.

Xystus robiniæ. *Peck.*

This is a singularly *Sphingiform* species, somewhat resem-

bling *Macroglossa*. The example sent is rather dwarfed, but still shows the character of the genus. It is well illustrated by Herrich-Schäffer, (Auss. Schmett., fig. 170). The genus *Xyleutes* of Hübner, to which Packard referred this species, consists of perfectly heterogeneous forms and, therefore, Mr. Grote's *Xystus* must be adopted, but I cannot, on that account, call it *robiniæ* Grote, any more than of Packard. This interchange of authors may be satisfactory to workers in the United States, but it causes us endless trouble here by obscuring the true authorship of the specific name, which to us is of far more importance than the generic. I heartily wish, and so does every Englishman on this side of the water, that American authors would reconsider their system of adopting other persons' children. In daily life such a course would be a heavy tax upon their own patience (and probably their pockets). In Entomology the burden falls upon their brother students.

AGARISTIDÆ.

ALYPIA SACRAMENTI. *Grote*.

Some of our examples of *A. langtoni* approach very close to this; perhaps, as Mr. Stretch says, the example of *A. sacramenti* is "larger," but not so appreciably larger as some specimens of *A. langtoni* are than others. The individual sent to us is from Colorado.

ALYPIA RIDINGSII. *Grote*.

A good, distinct species, allied to *A. macculochii*, which we have from Hudson's Bay. Mr. Edwards has sent us a pair of *A. ridingsii* from the summit of the Sierra Nevada.

COPIDRYAS GLOVERI. *Grote*.

This species interests me much from its close relationship to the Indo-African genus *Ægocera*. The primaries in *Copidryas* are, however, more Noctuiform. One specimen from Arizona.

ZYGÆNIDÆ.

GNOPHÆLA HOPFFERI. *Grote* and *Robinson*.

One specimen from California.

It would be interesting to compare the larva of this species with that of *Pericopis*. Unless I am much mistaken they would be found to be very nearly allied. (Compare figure of *P. catilina*, Cramer, Pap. Ext. 1, pl. 79, figs. E. F., which is referable to the sub-genus *Phaloe*, Guérin).

The genus *Pericopis* and its allies are *Arctiidæ*, but *Gnophæla* (for what reason I know not) was referred by Walker to the *Zygænidæ*, and has ever since remained there. It is true that the two families completely run together, so that one can only fix the boundary line between them in the most arbitrary manner,

but for all that, the typical *Zygænids* of South and Central America (the home of the family,) generally possess more distinctly Liparidiform larvæ than do the *Arctiidæ*, giving one the impression that a boundary line must exist somewhere. Although for convenience of reference I retain *Gnophæla* in the *Zygænidæ* I am quite prepared to hear that it is a true *Arctiid*.

GNOPHÆLA VERMICULATA. *Grote* and *Robinson*.

A male from Colorado.

This species appears to come nearest to *G. equinoctialis*, a female of which from Mexico I found associated with *Pericopis* in our collection. It also somewhat resembles the male of *P. aglaura*, Cramer, but the secondaries in *Gnophæla* are a little narrower than in *Pericopis*.

DAHANA ATRIPENNIS. *Grote*.

A specimen from Florida. The genus appears to me to come nearest to *Syntomeida*, but the body is less robust.

ARCTIIDÆ,

SUB-FAM. CTENUCHIINÆ.

CTENUCHA RUBROSCAPUS. *Ménétriés*.

Glaucopis rubroscapus, Ménétriés, Enum Corp. Anim. Mus. Imp. Acad. Sci. Petrop, Lep. 2d partie, p. 142, n. 1679, tab. IV, fig. 7, (1857).

Ctenucha walsinghamii. H. Edwards, Trans. Cal. Acad. Sci. Val. 5, p. 9, (1873); Stretch, Zyg. and Bomb., N. Amer., p. 213, n. 7, pl. 9. fig 1, (1872-73).

Washington Territory and Mt. Shasta.

I have long wondered what difference could exist between *C. rubroscapus* and *C. walsinghamii*, but until now have never compared them, as all the examples hitherto standing in our collection under both names are referable to the nearly allied *C. multifaria* of Walker.

It will be seen by a reference both to the description and figure by Ménétriés that there is no hint of a white costal margin in *C. rubroscapus*, and as this is the only distinguishing character between *C. multifaria* and *C. walsinghamii* the name must necessarily go. The only question in my mind is whether this costal character can be relied on, but of this my friend, Mr. Edwards, will be a better judge than I.

ARCTIIDÆ (typical).

LEPTARCTIA LENA, *Boisd.* = californiæ. *Walk.**

Knight Valley and Havilah, California.

I cannot distinguish the examples sent by Mr. Edwards from

* Nemeophila californiæ, Walk., Cat. Lep. Het. 3, p. 625, n. 3, (1855),

our specimens of *L. californiæ*, Walk. They agree absolutely in both sexes.

ARCTIA INTERMEDIA. *Stretch.*

Mr. Stretch notes this as "intermediate between *A. virgo* and *A achaia*." In pattern, however, it seems to me more nearly to resemble *A. Saundersii* than *A. achaia*.

ARCTIA ACHAIA. *Boisd.*, and var. OCHRACEA, *Stretch. Pl.* 5, *figs.* 18 *and* 21.

It seems hardly conceivable that these two insects can be conspecific. The species has been reared, it is true, but the only question in my mind is whether the insects figured on plate 5 of Mr. Stretch's book are all from the same batch of eggs. They seem to me to divide thus, 18-19 *achaia* and 20-21 *ochracea*. Fig. 17 looks like an aberrant female of the latter.

Knowing as one does that species are but local forms, which every year shows to be more nearly allied, until whole genera seem linked in one continuous geographical chain of hardly separable forms, it is necessary to be extremely cautious about associating, under one name, any two forms not proved to be conspecific. I am not speaking specially of the present species, for I do not doubt that my much esteemed friend had abundant evidence before him, but it has become a sort of mania of late years with many men, especially in Europe, to call all allied forms "varieties" or "sports," (for a true variety is nothing more than a sport or abortion), and this mania persisted in will unquestionably in a few years reduce nearly every genus to a single *variable* species in their eyes.

EUCHÆTES COLLARIS. *Fitch.*

Colorado.

We previously only possessed a single example from Georgia.

DIOPTIDÆ.

PHRYGANIDIA CALIFORNICA. *Packard.*

The larva and pupa of this species exhibit no affinity to the family *Zygænidæ* or to the *Psychidæ*. The imago has somewhat the aspect of the semi-transparent group of *Liparidæ*, but in structure it scarcely differs from the genus *Hyrmina* of the New World family *Dioptidæ*. The form of the body, antennæ and neuration are almost identical. The principal difference being that the furcation of the sub-costal branches of the primaries is shorter than in *Hyrmina*. I have no doubt whatever that the genus would be rightly located in this family.

SATURNIIDÆ.

HEMILEUCA NEVADENSIS. *Stretch.*

The genus is, I should say, nearer to *Pseudohazis* and *Eochroa* than to anything else, although the tufted abdomen of the male

reminds one of *Lasiocampa*.

PSEUDOHAZIS EGLANTERINA. *Boisd.*

Respecting this species I have nothing to say at present.

SATURNIA MENDOCINO. *Behrens.*

A species quite new to me.

LASIOCAMPIDÆ.

CLISIOCAMPA CALIFORNICA. *Packard.*

This is the palest form known to me.

LIMACODIDÆ.

EULIMACODES SCAPHA. *Harris.*

Limacodes undifera, Walker, Cat. Lep. Het. 5 p., 1149, n. s. (1855).

The example forwarded is from Pennsylvania, but it differs in no respect from Walker's type from Honduras.

TWO NEW HESPERIANS.

C. E. WORTHINGTON.

ENDAMUS OBERON. n. s.

Male, exp. 2.2 inch. Female, 2.4 inch.

Upper side, primaries brown with four irregular, semi-transparent, nearly confluent honey-yellow spots, arranged on a line from costa towards inner angle of wing, a detached yellow spot adjacent to third spot and between it and apex, the usual subapical three spots near costa, fringe concolorous. Secondaries, uniform brown, fringes tawny and without divisions, basal third of both wings, well clothed with tawny hair extending along abdominal margin of secondaries. Secondaries prolonged as in E. Tityrus.

Beneath. Primaries having all markings of upper surface repeated, secondaries with a faintly indicated paler median band extending two-thirds across wing, two faint spots between this and anal angle, and more or less scattering tawny scales, all wings below having a strong purplish reflection and slightly paler on posterior margins.

Body above purple brown, thorax covered with tawny hairs, beneath more or less shaded with fulvous, legs brown, becoming

fulvous towards the feet, palpi fulvous. Club brown above, fulvous below and at sides.

Strikingly resembles E. Tityrus on superior surfaces, but the yellow spots are less confluent and more opaque, the general color deeper and fringes not divided by brown on the veins; beneath it differs conspicuously in the more uniform color, the purplish cast and entire absence of the large silver spot so prominent in its ally.

Thirty-one examples, Marco Island, Florida, May, 1881.

ERYCIDES OKEECHOBEE, n. s.

Male expands 2.3 inches.

Upper side deep smoky brown, with a pronounced indigo-violet reflection. Primaries without markings, other than a few scattering blue or green scales about base of wings. Fringes concolorous. Secondaries with a row of brilliant blue or green elongated sub-marginal spots, more or less confluent, interrupted by the veins, and becoming obsolete towards anterior margin, fringes with some white in intervenular spaces.

Beneath, primaries paler and with a purplish cast, a few blue or green scales along the costa, about base and near inner angle of wing. Secondaries much like upper side, but deeper, the purplish reflection at anterior margin, gradually changing to deep indigo as it approaches the abdominal fold; a few blue or green scales in median space, and along abdominal margin, sub-marginal spots as above, but brighter.

Female expands 2.6 inches.

Upper side paler than the male (color of E. Pylades), gradually growing deeper over both wings until nearly black at anal angle, all wings with a faint purplish reflection in certain lights. Markings on secondaries like those of the male. Beneath differing from the male only in paler color, and in having a purple reflection, which is more pronounced than on upper surface.

Body deep brown above and below, some blue or green lines on collar, front and shoulders, and arranged in bands on posterior segments of abdomen. Palpi greenish white. Antennæ dark brown.

Twenty-six examples from Marco Island, Florida, May, 1881.

This form was first brought from Florida by Dr. J. W. Velie, of Chicago, several years ago. I am informed that Mr. Scudder has attached the name Okeechobee to some of these specimens, although I cannot find that he ever described the species, hence I retain the MSS. name. E. Okeechobee has been taken as far north as Indian River.

SOME REMARKS ON THE ALLEGED ABNORMAL PECULIARITIES OF ARGYNNIS MYRINA.

By W. H. Edwards.

[Read before the Ent. Sub. Section of the Am. Ass'n, at Cinn., 19 Aug. 1881].

In Amer. Naturalist for Sept. 1872, Mr. S. H. Scudder published a paper entitled "The Curious History of a Butterfly," which reads thus: "Of all American butterflies, Brenthis (Argynnis) *Bellona* presents the strangest history." Again: "In this genus, at least in B. *Bellona* and B. *Myrina*, occurs a phenomenon which, so far as I know, is quite unique among butterflies: there are two sets of individuals, each following its own cycle of changes, apparently with as little to do with the other set as if it were a different species; each set has its own distinct season and thus gives rise to the apparition of two or three successive 'broods' in the course of the year. At the very end of the season this butterfly will be found laying eggs, which hatch in a few days; the little caterpillars, after devouring their egg shells, refuse further food, and undoubtedly hibernate in this state; * * * This we will term the aestival series, for by the end of the following June, the caterpillars have attained their growth, and passing through the chrysalis state, emerge as butterflies about the middle of July; these are the butterflies of midsummer, continuing upon the wing until the end of September. In this butterfly the eggs are wholly undeveloped at the birth of the female, and in the aestival series are not deposited until September; they hatch in from five to nine days, and the young caterpillars, as we have said, pass directly into a state of hibernation, making the cycle of the year's changes complete with a single generation. The second set of individuals, which we will term the vernal, hibernates as half-grown caterpillars and produces the earliest brood of butterflies; these make their appearance about the middle of May, although they are occasionally seen earlier; they are hardly common before the end of the month, and are as long-lived as their companions of the aestival series; they do not lay their eggs until the latter part of July or early in August, just when the butterflies of the aestival series are becoming common; the eggs hatch and the caterpillars grow as usual, sloughing their integuments twice. Beyond this point all caterpillars do not develop alike: some continue in what would appear the natural way; we will first follow them—it will be to their grave! As caterpillars they eat, as chrysalids they sleep and then appear in September, gay and frolicsome butter-

flies doomed to an untimely end. Their sisters of the aestival series are busily laying eggs to perpetuate the race (for the phenomenon of midsummer is now repeated inversely, one series ovipositing, the other emerging from the chrysalis), but to them is this boon denied; the cold autumnal blasts sweep them away before the eggs are half developed in their ovaries. It is in fact a vain effort of Nature to develop a second brood, which in a more southern climate, with a longer season, would prove successful.

But we have said that this was the history of some only, and this fact proves the salvation of the vernal series; when about half grown, in the middle of August, while the weather is still hot, a portion of the caterpillars suddenly cease to eat and fall into a state of lethargy; * * * * they do not arouse themselves until the following spring, when they again resume the cycle of changes peculiar to the vernal series, and by this extraordinary habit preserve its history.

Here we have two independent series in the same species, each single-brooded, but one making an effort toward a second generation, invariably ending in disaster; the butterfly may therefore be properly considered as "single-brooded," although differing greatly from other single-brooded butterflies, by presenting three distinct apparitions of the perfect form. Whether by any lethargic feats, the caterpillars of the two series ever unite their faces (*sic*) and finally have a synchronous and parallel development, we are as yet unprepared to say; but that the blood of both series ever commingles through the union of the perfect insect is very improbable, because, although the generations overlap, the males of a brood are the first to disappear, and at best there would be few that could thus mate; moreover, since the eggs of the freshly enclosed females are not fully developed for weeks, or even months, the effect of such a union would be questionable; yet if there is no union between the two series, then are the vernal and æstival groups practically as distinct from each other as any two species!"

Mr. Scudder quotes the late H. Doubleday, showing that the habit of Argynnis *Euphrosyne*, of Europe, a species closely allied to *Myrina*, and belonging to the same sub-section of the genus, did not agree with his conception of *Myrina* and *Bellona*, and comments thereon as follows: "By this account the *butterflies lay their eggs on their first appearance;* either they differ in toto from their congeners in America, or there is some error in this statement." (Doubleday's). Mr. Doubleday was a lepidopterest of eminence and it was strange Mr. Scudder did not suspect the error to be in his own statement. Truly the foregoing was a curious history!

In Canadian Entomologist, Vol. 7, p. 189 et seq, 1875, I showed that the essential facts, namely, as to the eggs, in the foregoing relation were misconceived, the conclusions reached were unwarranted, and the history of these species could not differ from that of any other two-brooded species. Subsequently, in Can. Ent., in 1876, 1877, I continued the history and gave the facts which were at variance with Mr. Scudder's theory in several points, and I thought that ended the matter. I should not again have referred to this Curious History, had not Mr. Scudder in his recent work, "Butterflies," 1881, reprinted almost word for word his original statement, with no direct reference to the counter statements I had made, and unsupported by any further observation of his own or of any one. He has struck out the assertion that "the eggs are wholly undeveloped at the birth of the female;" but says, page 145, in speaking of the unhappy individuals of September, before mentioned: "It is, however, possible that some of them may lay eggs, which hatching, produce larvae which at once hibernate, and the following year become members of the aestival series. It appears more probable, however, that it is a vain effort of nature to develop a second brood, which in a more southern climate, with a longer season, would prove successful." And adds in a foot note, "Since this was written, some facts have come under my own and others' observations, leading to the belief * * * * that the butterflies of this brood" (*i. e.*, the last one in September, not any other of the series) "lay eggs at once."

Inasmuch as I had shown clearly that the females of several broods of *Myrina* were found on dissection to be filled with developed eggs when they emerged from chrysalis, and that in one instance, in midsummer, scores of eggs were laid by a female just out of chrysalis, it is something surprising that only "some facts since this was written," *i. e.* just before 1881, we may suppose, "*lead to the belief*" that the females of the *last brood* and that only, *may perhaps*, lay eggs soon after they emerge from chrysalis, though the author doubts if they do.

It will be noticed that the structure built up so ingeniously by Mr. Scudder is based upon this assumption:—"that the eggs are wholly undeveloped at the birth of the female;" "not fully developed for weeks or even months;" in consequence of which one of the two broods, described as æstival and vernal, cannot unite with the other, though *both broods may overlap* and be *flying at the same time. Here are femal s of the vernal brood emerging from chrysalis while those of the æstival are ovipositing*, as expressly stated; the eggs of the æstival having ripened *after the butterfly has been eight or ten weeks out of chrysalis.* The

vernal females must go along some months (the author says about three months in the Curious History, but changes to about two months in "Butterflies,") before their eggs are developed, and by that time the males of the æstival brood are understood to be dead, as "the males of a brood are the first to disappear."*

It is stated also—but this is of secondary importance to the preceding statement—that the æstival brood lays eggs in September, which hatch presently and the larvæ from them *go at once into lethargy*, while in the vernal brood the eggs are laid in July and August, and the larvæ from these last reach 2d moult and then all hibernate. It follows, if this be so, in Mr. Scudder's view, that these hibernators will have the earliest start the next spring, and will reach chrysalis and butterfly some weeks before the others who spent the winter in the egg. They get such a start in fact that the others cannot overtake them; though why so long-lived butterflies as these are asserted to be could not bridge over the gap of a few weeks, and the two broods be able to commingle, does not clearly appear—especially as individuals of the same generation breed irregularly, and all the preparatory stages are irregular as to duration, so that some weeks elapse between the first appearance of the earlier and later butterflies. But the author is sure the broods do not commingle and that each goes its own way "as distinct as any other two species." Each is asserted to be one-brooded only, though it is allowed that there is an *appearance as of three annual* broods, and the author has thought out as intricate a theory as that of Ptolemy to account for these apparent motions. The simple statement that the sun and not the earth was the centre of the system cleared up all difficulties in the one case, and the simple fact that the females of these butterflies lay eggs, or may do so, almost as soon as they emerge from chrysalis ought to relieve all doubt in the other. I assert that they do this, and that one generation follows another in direct succession from spring to fall, and that the mysterious appearance of three broods is accounted for without cycles and epicycles.

Now to the proof. I was at Hunter, New York, in the Catskills, at an elevation of from 1650 to 2000 feet above the sea, in July, 1875. The climate there is like much of New England, and any butterfly there we may be sure would behave just as it would do in Massachusetts or New Hampshire. Between 20th and 25th July I obtained many eggs of *Myrina* by confining the females in a bag over plants of violet. The caterpillars from these eggs began to pupate 27th August, and the butterflies to emerge 3d September. On 4th September 3 ♀ 2 ♂ came out, and

*This is contrary to my experience. I believe the females of all butterflies die shortly after laying their eggs, while many males, perhaps from not having found their mates, continue on the wing quite as long as any female.

this is evidence to show that the females emerge as early as the males in this species, contrary to one of the assumptions of Mr. Scudder. By 9th September 25 butterflies had emerged, and *none of the larvae had gone into lethargy*, as it was declared they were in the habit of doing. On dissecting newly emerged females, they were found to be full of nearly mature eggs. These were distinctly ribbed and shaped as when laid.

In Can. Ent., Vol. 8, p. 161, and Vol. 9, p. 34, I continued the history. In 1876, I went to Hunter again, earlier than before, and was there from 7th June to 1st July; consequently I was able to observe the first generation of *Myrina* of the year. (In 1875, I had observed the same generation.) The species was abundant when I arrived, and I judged, from the worn examples which I saw, that it had been on the wing at least two or three weeks earlier. Mr. Scudder says the first generation appears in May, and I have no doubt it does. On 19th June, I confined 2 ♀, and obtained 60 eggs. The first butterfly from these emerged 15th July. Other females gave eggs 27th June, and as I brought the caterpillars from these last to Coalburgh, and watched all their stages, I will speak only of them. The first butterfly emerged 23d July, the last 31st July, in 8 to 15 days after the butterflies had begun to emerge from the eggs laid 19th June. All these, of course, were of the same generation of butterflies of the year, namely, the second. The first 11 butterflies of this lot proved to be females, and several of the last to emerge were females; and of the whole number the larger part were of that sex. On dissecting one of them nearly mature eggs were found, as in 1875.

On 27th July, I turned loose 6 ♂ 6 ♀ of this lot of butterflies, all which had emerged during the preceding night, and about nine o'clock the same morning, I discovered a pair in copulation in the grass near my house. I left them in quiet for about an hour, and then, by placing the inner edge of the net carefully by them, the female climbed up dragging the male with her. From the net they were transferred to a box and left. By 6 A. M. next day they had separated, and I thereupon confined the female over violet. Within an hour several eggs were laid, and within 48 hours 93 were laid. The eggs began to hatch 4th August. I again went to Hunter, arriving on 18th August, and carried with me some of these caterpillars. They all went on to chrysalis and butterfly, the first butterfly, a ♂ emerging 1st September. On 2d September a ♀ emerged, and on dissection was found full of eggs.

I found *Myrina* flying on my arrival, and 21st of August obtained eggs in the usual way. These hatched 29th, and the larvæ, which according to Mr. Scudder should at once have gone

into lethargy, passed their second moult. By 20th September, after that moult, all had become lethargic. I got another lot of eggs 8th September, or 17 days later than the first. These hatched 22d September, and a week later, on the 15th September, I got more eggs, so that this generation was at least ovipositing from 21st of August to 15th September, or during 24 days. On 2d October, still at Hunter, I recorded in my notebook, "Cool weather, but no frost yet. Of the two broods of *Myrina*, all are lethargic, after second moult." The caterpillars of the third and last brood, from eggs laid 15th September, had passed first moult when I left the mountains, and died before I reached Coalburgh a few days later. Now if any caterpillars of this species ever become lethargic at once from the egg, it would have been these last broods.

Let us summarize these observations and see what result. In June I found the first generation of butterflies of the year flying, and they had been out some weeks. This is Mr. Scudder's "vernal brood," and which he says do not (because they cannot—their eggs not developing for a long time yet—) lay their eggs until the latter part of July or early in August. I, however, did obtain eggs from them on 19th and on 27th of June, and the females laid as soon as confined over the food plant, and abundantly. The first butterflies from the eggs of 19th of June emerged 15th July; the first from the eggs of 27th June on 23d July, and the last one on 30th July, so that from these two females of the vernal brood, butterflies in next generation were issuing through 16 days. Now as *Myrina* had been flying a good while before I reached the mountains, the difference between the emerging of the first and last members of the second generation would have been at least a month, or during all July, we may say. These July butterflies are Mr. Scudder's "æstival brood." He says that brood emerges about the middle of July, and "are the butterflies of midsummer," *only his æstival brood is not descended from his vernal.* They can't be because the vernal are *physically unable to lay eggs.* They are descended from those September caterpillars which went in lethargy direct from the egg, and so have consumed the spring and early summer in maturing.

Therefore we have got both vernal and æstival on the carpet by middle of July, and it would save me from as perplexing a study as a Chinese puzzle, if they would commingle and go about their business. But, as alleged, that is impossible. The vernals are only just getting in condition to lay their eggs, and the æstival, which have been emerging in July, have got to struggle along many weeks yet before their time comes.

To continue: I got eggs, laid 20th July, of females of the second generation, or Mr. Scudder's "æstival brood," and all

gave butterflies from 3d to 6th September. All of these which were to be of any avail in keeping up the species should, according to the theory, have stopped at the third larval stage and gone into lethargy. *But none at all did so.* Next, eggs laid 21st August, plainly by females of the third generation in direct descent, but which Mr. Scudder would make out to be his æstivals just come to the fore, gave caterpillars wihch did go into lethargy, *not direct from the egg*, however, as theoretically it was their duty to do, *but after second moult*, by 20th September.

Eggs laid 8th September of same generation, gave caterpillars which went into lethargy after second moult, before 2d October, and eggs laid 15th September, of same generation, gave caterpillars which passed first moult and died before second.

Here then are three annual generations of *Myrina*, in the Catskill Mountains. The first, proceeding from the hibernating caterpillars which reached their second moult in the fall, was on the wing at least during the whole month of June. The second, proceeding from the first, was on the wing all July, running a little into August. The third, proceeding from the second, was on the wing the last half of August and part of September, and from them came the caterpillars, which hibernating at second moult, produced the May and June butterflies the next year.

Everything here given is written down in my note book, written from day to day just as it occurred, and I merely make a transcript from it. There is no trusting to memory or incomplete memoranda, and no guessing.

Three annual generations, each on the wing a month at least, all the females capable of laying eggs shortly after emerging from chrysalis, the eggs wanting nothing but impregnation when the female came forth! Some of the first generation must have been flying when individuals of the second generation began to appear, and some of the second when the third began to appear; and as almost invariably the females taken in copulation in all species of butterflies where I have been able to make observations, are fresh from chrysalis, or but a short time from chrysalis, while nearly all the males so taken show signs of considerable age, it follows that the males of one generation may easily mate with females of the next. So that the generations commingle more or less; and this may very probably be the reason why, in *Myrina*, no tangible difference can be discovered between the butterflies of the several generations.

It will also have been observed, that in no case did a caterpillar go into lethargy immediately after the egg; and in no case did a caterpillar, proceeding from any generation but the last one, go into lethargy at all, and then always after second moult. So that all start fair in Spring, and feed and go on to chrysalis and

butterfly according to the state of the weather, or according to the locality occupied by each individual. One may be in sunshine while the other is in shade, and in the Catskills or New England, one may be feeding when the other would be unable to find a mouthful,—perhaps has been buried under a snowbank, or has wintered in some cold glen, like the Stoney Clove in Hunter. So that the date of emerging of individuals of the first generation will vary many days, or a month, and this and other influences keep up a similar variation in the generations all the year.

THE LARVÆ OF CATOCALA FLEBILIS AND CATOCALA AMATRIX.

By D. S. Kellicott.

Flebilis.—Two larvæ were taken on the trunk of a hickory *Carya alba*) at Hastings Center, N. Y., July 25, 1881. Length, 58mm., width of body 6.75 mm., width of head and first thoacic segment 4.25 mm., onisciform. The color is gray with a greenish tinge; under a lens it is faintly pink. The dorsal line is rather faint, made up of closely placed lines of black dots; the subdorsal is wider and more conspicuous, on each abdominal ring there is an illy-defined >– or > situated in this line; the stigmatal line or stripe is still more distinct and continuous, the large, black-ringed, elliptical spiracles are situated, except the first, wholly in this line. The papillæ are white, each bearing a fine brown hair; those on the first thoracic ring, however, are dark, or black; on the abdominal rings the posterior pair are situated in the angle of the >– referred to above. The bluish gray head has lines of confluent whitish spots so arranged that the surface has the appearance of watered silk; on the top of the head there are four brown dots placed at the angles of a square. There is a black line extending from the articulation of the jaws half-way up the cranial lobes in front of the ocelli. Head flattened. Feet of the same line as the body, ornamented with black slashes. The lateral fringes are hoary. The ventral surface bluish white with black and flesh-colored spots; thus: the thoracic rings have each an elliptical patch of the latter color; fourth, fifth, tenth and eleventh rings have each a similar black one; the sixth and seventh rings have reddish spots bordered in front with black; rings eight and nine are provided with large spots similar in color without the black border.

One larva spun its loose cocoon among the leaves June 28,

and changed to pupa July 1. It was 28mm. long, of the usual form and color. Cremaster armed with eight hooks placed as usual, *i. e.*, the four lower stout ones turned outwards; the four upper weak ones turned towards the median line.

The imago appeared July 27. Expanse 70 mm.

AMATRIX.—One larva was found, Corinna, Mich., July 24, under a large-toothed aspen* (*Populus grandidentata*). Its length at rest, 68 mm., when crawling, 77 mm., width of head, 4.25 mm., width of first thoracic ring, 5.5mm., width of eighth and ninth rings, 9 mm. The usual form. The color gray with a reddish shade, more pronounced at the articulations. The slightly flattened, mottled brown head is more prominent apically than *flebilis;* it is bordered laterally by heavy black lines. The first ring bears above a quadrate patch having the color of the head faintly spotted with white. The dorsal line is quite inconspicuous. The first three rings are strongly wrinkled transversely, the remaining rings have only their posterior third more or less thus wrinkled. The eighth ring has its transverse fold elevated into a light clay-colored protuberance, there is a black splash on either side at its base, at the lower edge of which there is a small black circle with dot at its center. Of the four dots borne on the back of the body rings, the posterior pair is brownish and larger than the anterior; this pair on the eleventh ring become pronounced tubercles, having a black streak passing forward from them just above the spiracles. The hairs from the papillæ are dark. The lateral fringes are pinkish. The ventral surface is white with more or less of black or brown on each ring. On the first three brownish, the patches illy defined, on the succeeding four sharply defined black, largest on the sixth and seventh, on the remaining rings smaller and brownish.

The pupa appeared July 31; the moth August 27. The pupa was 38 mm. long, rather thich. Its color, surface and hooklets of the cremaster as in *flebilis*.

The pupa was quite inactive for one of its genus, when disturbed would not throw itself so violently from side to side as some others do.

PROFESSOR RILEY ON DAKRUMA.

BY A. R. GROTE.

Although I have carefully studied the characters of a number of genera and species of *Phycidæ*, and, therefore, ought to appreciate any discussion upon them, I confess I do not fully under-

* Mr. Fischer, of Buffalo, has also bred *amatrix* this summer from larvæ found on the Lombardy poplar.

stand Mr. Riley's remarks on "*Pempelia grossulariæ*," in the July number of Papilio, from the Bull. U. S. Ent. Commission. It is really difficult to always understand what is meant by the labial palpi being "recurved" or "porrect," and in this group I have taken the venation, maxillary palpi and antennæ as the basis of genera, *not* the labial palpi. I am accused of describing these latter as "porrect" in *Stenoptycha*, and also of having stated that *Honora* is to be considered as a section of *Stenoptycha*. I have done neither. I do not describe *Stenoptycha* at all, and I say that *Honora* "seems to fall in with a section of *Stenopoycha*" of which I had not the European species to compare. Again, *Dakruma* has other characters which will easily separate it from *Zophodia Bollii* and *Z. dentata*, the only species of that genus I know. I am quite sure that, in naming his species, Dr. Packard did not intend to be as exact as to the genus as might be expected in a paper on special classification, and thus his opinion should not be made use of as by Mr. Riley on this occasion. In working up my material I could not place *Dakruma* among any of Von Heineman's genera and so described it as distinct, and whether the species is European or not, this question is not affected. It is true that Mr. Riley says that some specimens of *grossulariæ* do not "*appear*" to present the character of *Dakruma*. What is meant by "appear?" Do they, or do they not? When more material is brought together the question of *Dakruma* will be settled at some future time, but Mr. Riley will hardly have contributed to the decision by his present remarks. Although I did not think that Professor Comstock's *Dakruma* was congeneric with *grossulariæ*, still, after examining the neuration, Professor Comstock found it identical. It is very probable that the classification of the European species will be considerably changed after the North American are known. This is the case already in many groups of insects and can hardly fail to be so in families like the *Pyralidæ*, *Phycidæ* and *Tortricidæ*, where the European and American forms fit in together. It is less likely to be so with the *Noctuidæ*, where there are large quantities of forms, (*i. e.*, Guenée's *Quadrifidæ*) comparatively wanting in Europe. But in order to come to any scientific opinion in the matter, a certain quantity, at least, of genera have to be studied, and I must refer to the fact that before my paper was published Professor Riley's descriptions in that group (*Phycidæ*, i. e., *Pempelia* (?) *Hammondi*) were made without any vital structural features at all being given; and certainly, by citing such forms as *Grossulariæ* and *Hammondi* under *Pempelia*, Professor Riley showed that he had not at all carefully studied the genera of *Phycidæ*.

I thought that Professor Riley's *Grossulariæ* might be a *Homeosoma* when writing my paper. I was reasonably sure the insect could not be a *Pempelia*, but, in the absence of any decisive structural features being given, the drawing and description were

not enough to identify the species with *Turbatella*. But when I afterwards found out what species was intended, I at once made the correction in the pages of the *North American Entomologist*, to which article reference should have been made in any further discussion of the matter.

In a group so difficult as the *Phycidæ*, the decision as to what are generic characters should be left to the student who has worked over the largest material; and any correction of his action, to be of value, must be made from a wider knowledge of the group. So far as I have gone, I am not prepared to reject the venation as a guide to generic relations in the *Phycidæ*. I hope, however, to have an opportunity soon for studying the family with augmented material, and for this purpose would be glad to receive specimens from any locality.

LARVÆ OF TWO SPECIES OF EUCLEA.

By G. H. French, Carbondale, Ill.

E. Paenulata, Clem. In general outline somewhat elliptical, the sides and the back tapering from the middle to both extremities. Length, when full grown, .56 of an inch; width and height, in the middle, nearly .25 of an inch. These measurements were taken when the head was withdrawn beneath the second joint. The body, like others of the genus, destitute of true feet, but locomotion was performed by means of a soft, pliable membrane covering the ventral surface, with which the insect slides over substances instead of walking. General color of dorsum, or dorsal space, dull purplish brown, having under the glass a slight orange tinge. A fine dorsal line, and a broader one each side, which alternately expands and contracts, of dull purplish orange. On each joint, except the twelfth, is a pair of impressed spots, which appear whitish when seen in certain lights.

In the region of the sub-dorsum is an orange ridge containing tubercles, which are covered with spines. These tubercles are of the same color as the ridge, except that between the last two there is a shorter black tubercle without spines. The second and third from each end of the body are larger than the others. A similar tubercled ridge is found in the region of the stigmata except that it does not contain any black tubercles. Sub-dorsal space dull, purplish orange, bordered above and below with purplish brown, each joint containing two whitish impressed spots

similar to those on the dorsal space. Below the lower line of tubercles, dull orange.

The single larva from which the above description was taken was found feeding on a willow leaf, September 19, 1880. It pupated September 30, in the manner usual to this group and produced the imago June 17, 1881, a ♀.

E. MONITOR, Packard. In shape and character of markings similar to the preceding. Length .56 of an inch, width .25 and height .19. Color dull, whitish green, the ridge and row of spiny tubercles in the sub-dorsal and stigmatal regions, a little more of a distinct green. Like the preceding species, this larva has a black tubercle without spines in each sub-dorsal row between the last two spined tubercles. The spines on the tubercles are white at base and black at the tips. Like the preceding, each joint, but the twelfth, has on the back and each side two whitish impressed spots. These are surrounded by black lines, formed along the ridges, connected by transverse lines passing between the impressed places. The green on the sub-dorsal ridges is broken in three places by black.

Two of these larvæ were found feeding on oak leaves, the first, September 20, 1880, and the second, September 30. The first pupated October 2, and the other soon afterward. They produced imagines June 12 and 20, 1881, the first a ♂ the second a ♀.

DESCRIPTION OF A REMARKABLE NEW GEOMETRID.

BY B. NEUMOEGEN.

ASPILATES VIRIDIRUFARIA. n. sp.

This fine Aspilates has been found by me in a single ♀ specimen in the Greenhorn Mountains of Colorado, in the season of 1880. This season my indefatigable collector, Mr. I. Doll, was fortunate enough to find the ♂ mate of it near Prescott, Arizona.

Looking at it, it reminds one of the much smaller *Chloraspilates bicoloraria*, while it differs in the palpi, being as in *Aspilates*, and in the shape of the wings. It is green and reddish like Bicoloraria, but the head is not concolorous with the green thorax, but of reddish color, and the insect is much larger. In point of ornamentation there is a resemblance to some forms of Coloraria.

Head and primaries are of dark grass-green color, the fringes being reddish, the costal edge likewise having a narrow reddish

tint. The lines are obsolete, but below vein 3 there is a brown-reddish irregular transverse band resting on the internal margin, and surmounted by a similarly colored rounded spot in the interspace between veins 3 and 4. In the ♂ this spot tends to form a line with the transverse band.

Secondaries of a dull ochrey red with concolorous fringes and irrorate.

Beneath both wings are concolorous ochrey, irrorate or stippled with red and with discal marks indicated. Abdomen and legs reddish. Head reddish, with the palpi, breast and fore-legs bright, purply reddish.

Expanse 40-43 mil.

Habitat: South Colorado, probably New Mexico and northern Arizona.

Types. Coll. B. Neumoegen.

PAPILIO.

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AN AQUATIC NOCTUID LARVA.

Arzama Melanopyga Grote, new species.

By Prof. J. Henry Comstock, of Cornell University.

During the month of January, 1880, I found the larva of a Noctuid moth very common in the leaf-stalks of pond lily in Lake Beresford, Florida. The larva bores a hole from the upper side of the leaf into the petiole, which it tunnels in some instances to the depth of two feet or more below the surface of the water. The species was very common, a large proportion of the leaves of the lily in that lake being infested. There was, however, but a single larva in each leaf. When full grown the larva measures from 50 mm. to 70 mm. in length, and it is a little more than 5 mm. in diameter. The color of the dorsal surface is dark olive gray, and of the ventral surface pale olive gray; its head is light reddish brown. Some specimens are much lighter in color, being quite transparent. These larvæ are well known to the people living near the lake, who use them for fish bait, and call them "bonnet worms;" the term "bonnet" being applied to the large leaves of the lily.

From larvæ which I collected at that time and sent to Washington, two moths were reared. These were referred to Mr. A. R. Grote, who determined them as an undescribed species of *Arzama*, and kindly prepared a diagnosis of the species under the name of *A. Melanopyga* for publication in my report as Entomologist of the Department of Agriculture. As I was unable, for want of time, to prepare an article on the subject, I did not include Mr. Grote's description in my report. I now, therefore, in justice to him, hastily pen this note, in order to put on record his description, which I have already withheld too long.

I have recently found a larva in considerable numbers in the

leaf stalks of our common yellow pond lily (*Nuphar Advena*) at Ithaca, N. Y., which I believe to be *A. Melanopyga*. These I have now under observation in aquaria in my laboratory. And I hope ere long to be able to give a detailed account of them. I will now briefly record a few of the more interesting points already observed.

The larva is furnished with nine pairs of spiracles, each of which, excepting the ninth, occupies the usual position. The ventro-dorsal diameter of the last segment is much less than that of the remainder of the body, this segment appearing as if the dorsal half had been cut away. The spiracles of the penultimate segment are situated in the dorsal part of the posterior end of the segment; which, on account of the peculiar shape of the last segment, is free. These spiracles are much larger than the others, and are doubtless the ones chiefly used while the larva is in its burrow. The position and direction of these spiracles remind us of the arrangement of the respiratory system in many Dipterous larvæ, which live either in water or masses of decaying matter. Frequently these lily-borers remain with only the caudal tip of the body projecting from the water, evidently using the posterior spiracles as just indicated. They can, however, descend below the surface of the water and remain there a long time. My observations on this point are limited, but I have seen a larva remain entirely under water voluntarily for the space of a half hour. The tracheæ of these larvæ are unusually large. May they not serve as reservoirs of air for the use of the insect while under water?

These larvæ are able to pass on the surface of the water from one leaf to another. This they do with a motion similar to that of a water snake.

Associated with the larvæ of *A. Melanopyga* in Florida, I found another Lepidopterous larva, a somewhat smaller insect, living more upon the surface of the leaf. This species I failed to rear to the adult state.

The following is Mr. Grote's description:

ARZAMA MELANOPYGA, n. s.

♀. Allied to *Vulnifica*, with very similar markings and color, but the thick anal tuft of the female is discolorous and black or blackish. Front unarmed, smooth. This character separates *Sphida Obliquata* from *Arzama Diffusa*, *Vulnifica* and *Melanopyga*. According to Mr. Butler, who has kindly examined Mr. Walker's type of *Arzama Densa* from Georgia in the British Museum, the type of the genus agrees in having the front smooth. The two genera are allied, but the characters of the clypeus are decidedly of generic value in the moths; upon these several genera are founded, and we can thus separate *Ochria* (Gortyna *Led.*) and *Gortyna* (Hydroecia *Led.*). Both *Arzama* and *Sphida* are internal feeders; the chrysalids of *Obliquata* have been taken in stumps

under circumstances which lead to the belief that the larva may be a wood-feeder like *Scolecocampa*. The horned clypeus is evidently correlated with function in these internal feeders. In *Melanopyga* the thorax and forewings are dusky yellow; the stigmata concolorous; the lines oblique, uneven, the posterior line dentate, the median shade indicated. In color the lines are dark, with a reddish tinge; the terminal space shaded with dusky without the dentate subterminal line. In color this species is paler than *Vulnifica*, the abdomen more grayish. The hind wings are stained with reddish; in one specimen the border remains grayish. *Expanse* 40 mil. Two ♀ specimens reared by Prof. Comstock from larva boring in leaf-stalks of pond lily. I have a specimen of *Vulnifica* ♀, collected by Mr. Schwarz in Florida with pale anal tuft. I might be inclined to consider the paler color and black anal tuft varietal characters, but the transverse posterior line is less rounded and more acutely angulated below costa in *A. Melanopyga*.

A LITTLE BEAUTY FROM NORTHERN ARIZONA.

By B. Neumoegen.

Sphinx (Hyloicus) Dollii. n. sp.

Head light gray, with two black spots near antennæ. Antennæ brownish with light gray pectinations. Collar light gray, but thorax and patagiæ whitish gray, with two broad dark gray stripes along tegulæ, accentuated with black at their commencement at collar.

Primaries light gray shading off into whitish towards base. Costal edge darker gray. Fringes whitish with darker gray spots alternately at the intersection of the veins. A blackish dash from apex pointing diagonally towards base and fading away in discoidal veins. Two short blackish dashes between 1st and 2d and 2d and 3d median veins, parallel with the neuration.

Secondaries uniform brownish gray with fringes alternately dark gray and white.

Beneath uniform cinereous with the blackish trace of the apical, diagonal dash of primaries. Fringes as above.

Abdomen light gray, with a black dorsal line and black and white lateral intersections at segments.

Expanse of wings, 1.15-16 inch.

Habitat: Prescott.

Type ♂., Coll. B. Neumoegen. This little beauty is gratefully dedicated to my faithful factotum, Mr. I. Doll, who, undaunted by the strain of a torrid zone and the attacks of Indians, pursues his duty of collecting material for our Science.

DESCRIPTION OF THE PREPARATORY STAGES OF THECLA HENRICI, GROTE.

By W. H. Edwards.

EGG.—Shaped like that of *Lycaena Violacea*, flattened and depressed, about this depression the ridges are reduced and the surface is finely reticulated: but elsewhere there is a white frosting of peaks and ridges; color whitish green; this lace work seems to be separable, and in one case where the egg had been rubbed by a leaf, apparently, a film was turned up, and the real surface was seen to be delicate green. Duration of this stage, 5 or six days.

YOUNG LARVA.—Length, 4-100 inch; shape, oval; broadest anteriorly, the base flattened; dorsum high and sloping posteriorly; the summit of dorsum flattened for a little space, and on either side there is a row of long recurved white hairs; along edge of base is another row of similar hairs, bent down; color brownish yellow; head obovoid, and smooth. Duration of this stage, 5 days.

After 1st Moult.—Length, 8-100 inch; same shape; segments rounded, but on dorsum rather angular; a red-brown medio-dorsal stripe stopping at 12; on either side of this dull yellow-green, with a macular brown line next outer edge, and limiting the dorsal area; sides sloping a little incurved, red-brown, with a broken yellowish line; a similar but continuous line along basal ridge; whole underside yellow-green; body much covered on upper side with short, stiff, brown hairs; head cordate, smooth, yellow-green. To next moult between three and four days.

After 2nd Moult.—Length, 12-100 inch; shape as before; the dorsum is considerably elevated, a tuberculous ridge across each segment, from 4 to 11; color red-brown and dull yellow-green; a red medio-dorsal band, tapering to a point posteriorly; through the band runs a green line; outside this band is a green one, containing a little red-brown speck on each segment; sides red-brown, with a green longitudinal line in middle; basal ridge green. To next moult, 5 days.

After Third Moult.—Length, 3-10 inch; greatest breadth 12-100 inch; the dorsum from 4 to 11 presents a series of elevated ridges, one to each segment, narrow in front, broad behind; the summit of dorsum flattened and a little concave, and this is covered by a broad band, cut by a paler line; the remainder of the elevated ridges yellow-green, making a macular green band; sides sloping, nearly flat, red-brown, with an indistinct green line; segment 2 is a broad, elevated rolled collar, in which the head is concealed; 3 has a similar collar in front; basal ridge green, head yellow-green.

One day later, length 4-10 inch: the color has changed to port-wine red, the sub-dorsal area remained yellow-green, but was

red-tinted on the posterior part of each segment; the sides same red; a pale red line along basal ridge; about the spiracle a little green; under side diluted wine color; body covered with short brown hair.

One day later, at 5-10 inch; greatest breadth, 19-100; width, 14-100; same color as on previous day.

Still one day later, length 56-100, same color, stopped feeding, and 4 days later fixed for chysalis. In about 24 hours it pupated, at 8 days after 3d moult (as observed).

CHRYSALIS.—Length, 3-10 in.; breadth of abdomen, 2-10, at mesonotum 13-100; height of abdomen 19-100 inch; oval at both ends; the abdomen distended, narrowing anteriorly; the mesonotum rounded and sloping to top of head case; the under side almost straight from end to end; color black or brown black, with obscure red bands; and being on either side a narrow black stripe in middle of abdomen; on mesonotum this stripe disappears and the red remains; whole surface finely corrugated; the dorsum and sides much covered with short hairs, and along the venter is a line of longer ones. The chrysalis will pass the winter.

On 17th of May, 1880, I happened to be standing under a wild plum tree near my house, and with no special motive reached out my hand and plucked a young plum. On this there appeared an onisciform caterpillar with head and some segments of body buried in the side. Feeling sure it was of some butterfly, I searched long for more larva, but found none. I did see one on the plums on another tree which had been partly excavated. This caterpillar was in the penultimate stage, as it turned out, and I raised it to chrysalis, always feeding on the inner part of the plum. The chrysalis died during the winter, and before any color came to the wings of the pupa, so that I had no clue whatever to the species or even the genus. I hoped it might prove to be *Fenesica Tarquinius*, but thought it was a Thecla; it might be *T. Poeas*, rather a common species here, and the food plant of which I had tried in vain to discover.

About middle of April, 1881, Mr. T. L. Mead visited me, and on several days brought in examples of *Thecla Henrici*, and confined some of the females on whortleberry and oak, the former suggested by Scudder's list of food plants, published in Am. Nat., 1869, but got no eggs. On opening one of these females the eggs were found fully formed. Finally it occurred to me to try wild plums, and the bag was tied over the end of a branch still in flower. No eggs were observed till the fourth day, when I found fifteen had been laid in a bunch, all but one at the base of a flower stalk, on the upper side. Although watching these carefully, the branch having been cut off and set in a bottle of water, they hatched when I was not at home, and all but six of the caterpillars were hurt by dropping off. The egg shells were eaten scarcely more than enough to permit egress. To prevent further

loss I laid the young caterpillars on the floor of a tin box among some plums, and they soon found the stalks and climbed up. The plums were but just from the blossom and tender enough for so minute a caterpillar. Evidently the eggs are laid just at the right season for the caterpillars to seize the newly-found plums. A little too early or a little too late might be fatal. So also the eggs are laid at just the right spot, on the back at base of the stalk, and instinctively the newly hatched creatures ascend to their food. They grow with the plums, and when the caterpillars are matured the plums are of large size. The attack was made at once on the side of the plum and a hole was eaten out large enough for the head to enter, and thereafter the caterpillar spent most of its time with head in the cavity. I brought fresh plums as often as the old ones wilted, and transferred the caterpillars to them, but from one cause or other, probably from feeding in this artificial manner, all the latter died excepting one. When a moult approached it came out of its burrow and rested either on the side of the plum or on the leaf. At one-quarter inch long, *i. e.*, when half grown, it seemed to have its head and shoulders buried at least from 6 A. M. one day till 9 P. M. the next, with no withdrawal observed by me, and I looked at it frequently. Cutting open the plum the excavation would be found reaching quite across and around the pulpy stone, which in the earlier larval stages was not eaten. But after 3d month this was eaten and the entire plum excavated. In no case was the skin eaten except at the entrance. I placed damson plums in the box, but the wild ones was always preferred.

I am confident that the caterpillar of 1880, before spoken of, was of this species, although the color differed greatly. That was wholly green, in shades, except for two subdorsal brown stripes. The caterpillar of 1881 was port wine red. But they were of same size, same shape, and the habits were precisely alike. In Lycæna *Violacea* some of the caterpillars are nearly white, some are green, and some are wine-red. Perhaps hereafter on raising a brood of the caterpillars of *Henrici* both red and green ones will be found.

The caterpillar of 1880 is described thus:

Mature.—Length 5-10 inch; shape as of *Henrici*, color yellow green, yellow predominating on the sides; the dorsal elevations have the summits yellow, the outsides greenish; the medio-dorsal stripe green, edged on either side by a brown line.

NOTE.—In my Catalogue, 1877, I gave *Henrici* as a marked variety of *T. Irus*. I am inclined to regard the two as distinct species, though nearly allied. Both are found here, and at the time Mr. Mead confined females of *Henrici* over whortleberry and oak, he treated *Irus* in same manner. Also, afterwards, I tried these over plums, but in no case were eggs obtained. Fresh specimens of *Henrici* are of a delicate yellow-green color beneath, and this fades soon after death.

NEW MOTHS FROM ARIZONA, WITH REMARKS ON CATOCALA AND HELIOTHIS.

By A. R. Grote.

The following moths, collected at Tucson, are in the collection of Mr. Berthold Neumoegen. We do not know enough, as yet, of the lepidopterous fauna of Arizona to decide upon its character. There are found within its limits Southern species which we have also from Texas; Western, from Illinois to Colorado; while it offers a number of strange beauties of its own. It will be one of the richest fields for the collector for sometime to come.

In what I have written here as to the conduct of Mr. Hulst, and Mr. Strecker, I have tried to speak for the good name of our science, no less than to vindicate names proposed by myself and insure a correct synonymy.

Ameria Unicolor. Robinson.

Also from Texas. The genus may be referred to the Lithosians, and seems to fall in between *Euphanessa* and *Crocota*. The wing structure is like *Euphanessa;* the color is that of *Crocota*. The ocelli are wanting. I have regarded *Crocota* as belonging to the Arctians, and, in my arrangement, inaugurating that subfamily, the ocelli are present. This species of *Ameria* is frail, unicolorously orange, the wings partially transparent, or subdiaphanous; the antennæ are blackish.

The specimen is from Prescott, as also *Cymatophora Pulmonaria*, and *Grotella Sexseriata*, described in this paper. The others are generally from Tucson.

Charadara Palata. Grote.

♀. The female of this species has the hind wings gray, not white, as in the male type from Colorado.

Apatela Edolata. n. s.

♂ ♀. Allied to *Xyliniformis*, but much larger, and darker, shaded with black. Hind wings white, veins a little soiled in the female. Forewings with a white, vivid, acutely dentate, t. p. line, as in its ally. Below the median vein, the wing is shaded from the base outward, longitudinally, diffusely with black, and again from opposite the disc to outer margin. *Expanse*, 38 to 40 mil.

In this form the blackish thorax and primaries are very different from *Perdita*, *Persuasa* and *Afflicta*. The species belongs to another group.

Agrotis Texana. Grote, Proc. Ent. Soc., Phil., 2, Pl. 6, fig. 2.

A specimen from Arizona belongs evidently to this species, though it is less strongly marked than my figure. The fore wings are yellowish brown, the hind wings whitish. The size is about that of *Pastoralis*. Whether this is the same as the

European *Segetum*, is not known to me. I have never seen this species from the East, and it is probably a good species.

PERIGEA LOCULOSA, n. s.

♂ ♀. A Hadenoid form, with naked eyes, untufted abdomen, unarmed tibiæ. Forewings bright and light reddish brown, with the veins streaked with black. The black median lines near together; the inner line sends out an open tooth across the median space, meeting the outer line on submedian fold. The lines meet again on internal margin. Reniform shaded with white, conspicuous. Fringes dark, checkered with pale brown. Hind wings white, translucent, with narrow fuscous edging in the male; shaded with fuscous and with the veins darker in the female. Thorax reddish brown. There are none but the two median lines on forewings, black, edged with pale, not very distinct, the inner median line conspicuous for its strong dentations. *Expanse* 26 to 28 mil. Several specimens. This species recalls, in appearance, the Californian *Graphiphora Perbrunnea*.

HELIOPHILA BICOLORATA, n. s.

♂. Eyes hairy; thorax untufted; tibiæ unarmed. Fore wings and thorax light straw color, immaculate, concolorous. Hind wings and abdomen pale reddish. Beneath the wings are shaded with reddish, like secondaries above. There are no markings whatever. *Expanse* 31 mil.

This species can be confounded with no other, the fore wings are long and rather narrow. It may be catalogued with *Prægracilis* and allies.

Heliophila differs from *Graphiphora*, by the narrow primaries, with their more parallel costal and internal margins, together with the more prominent labial palpi.

GRAPHIPHORA CONSOPITA, n. s.

Eyes hairy. Allied to *Rufula*, from California. The color varies from reddish (♀) to pale clay (♂). The median lines are even, double, faint, pale-lined, wide apart. Wing concolorous, no other than the median lines apparent. Reniform indicated. Hind wings pale, shaded with fuscous. This inconspicuously marked form recalls *Pseudorthosia Variabilis*, but the markings are simpler and less obvious, while the tibiæ are unarmed. *Expanse* 31 to 32 mil.

In this species the ovipositor is visible and the relationship to *Rufula* is evident. But the dotted t. p. line and other markings in which *Rufula* approaches our Eastern *Oviduca*, and leads me to expect that the two may be found to intergrade, are wanting in *Consopita*. The difference in color may be varietal or sexual.

BASILODES CHRYSOPIS, n. s.

Smaller than *Pepita*, paler and less brilliant. Eyes naked; front projecting, with a clypeal depression. Primaries pale yellowish, with a golden luster terminally, especially over subterminal

interspace. Spots small, paler than the wing, rounded; reniform with a black point. Lines indistinct, thread-like, in their general course like those in *Pepita*, but less angulated. Hind wings quite pale, silky, white, unlike *Pepita*. Beneath pale, without markings. Head and thorax like forewings. *Expanse* 35 mil. One fresh specimen.

CHARICLEA PERNANA. n. s.

Eyes naked. Front roundly projected. The surface of the clypeus shows a circular rim, enclosing a perpendicular protuberance. The legs are slender and appear unarmed, but of the front tibiae I have not been able to observe the structure. Colors and pattern of ornamentation of the European *Delphinii*, but one-third of the size; the terminal space on primaries, outside of the t. p. line, being olivaceous. Fore wings vinous purple to t. p. line, which is irregular, preceded by a fine line and oblique vinous shading. Inner line angulate, accompanied by vinous shades. S. t. line vague, clouded, deeper marked before the margin, brownish olive. Fringes very pale olivaceous ochrey, as is the wing behind the t. p. line. Hind wings pale fuscous, without marks. Body pale; front with some vinous scales. *Expanse*, 20 mil.

GROTELLA SEXSERIATA. n. s.

Of the same shining white as *7-punctata*, but a little slighter and longer-winged, the primaries crossed by two very distinct black, irregular lines (in place of the usual median lines), while the subterminal line is represented by a series of black spots. All this vividly contrasts against the satiny surface of the primaries which show no other marks. Hind wings pale yellowish-fuscous. Body parts yellowish. Front with a circular projection. Clypeus full. Beneath the wings are shaded with fuscous; fringes and edges yellowish; secondaries inferiorly yellowish. Anal hairs yellowish; body dull whitish. Eyes naked. *Expanse* 26 mil.

The insects of this group are undoubtedly Noctuidae. The fore tibiae are furnished with a claw and a terminal spinule. They have the aspect of Lithosians from their colors. The tarsi are feebly armed, not unarmed as given by Dr. Harvey.

PYROPHILA GLABELLA. *Morrison.*

This species we have from Illinois, California and now from Arizona. It enjoys a wide range and seems to vary but little. The specimen from Tucson is very dark, with the pale terminal space of primaries violently contrasting.

TARACHE BINOCULA. var. VIRGINALIS. *Grote.*

A specimen very nearly like my type from Texas. In this form, the mesial olivaceous-ocher median shade line is perpendicular. The subterminal violet blackish shading of the type is entirely absent from the white primaries of the variety. *Is* it a variety?

LYGRANTHŒCIA BALBA. n. s.

Fore wings faded ochrey, shaded with fuscous within the curved basal line. A dark reniform spot, near the outer line. The lines somewhat incomplete. The outer line is broken into dark spots below median vein. The subterminal space darker, constricted by the very pale tint of the terminal space opposite the disc. Hind wings blackish over whitish; the interlined fringes whitish at base. Body pale ochrey. Beneath very pale ochrey; on fore wings the blackish stigmata, the outer line, and dark s. t. space rather well marked. On fore wings above, the marginal line is broken into dots. This form appears to belong to the *Separata* group. *Expanse*, 25 mil. A number of specimens examined. An inconspicuous fady species, with the darker shades of the primaries giving them a soiled appearance.

In *Lygranthœcia Marginata*, the type of the genus, the eyes are naked. The fore tibiæ have, on the outside, four stout blunt spines in a decreasing series towards the base of the joint. On the inside there is first a long spine opposite to the longest of the outside series, at the extremity of the joint; these two spines embrace the base of the tarsi. There is then a second long spine on the inside of the tibiæ, followed by a very short one. All the tibiæ are armed. With this, the new form *L. Balba*, disagrees by the slenderness of the two inside spinules on the front tibiæ, and the presence of but three spines on the outside. The genera of the Heliothid group need revision, as the species are numerous. For the present I keep the genera already established, and refer the species with ornamentation after the pattern of *Lygranthœcia*, to that genus, until the armature and genitalia of each species can be studied and compared.

LYGRANTHŒCIA COERCITA, n. s.

In my collection is a species from Nevada, allied to *Balba* in appearance, but differing by the presence of four blunt spines on the outside of the fore tibiæ. It is very pale and differs from *Separata* by the hind wings being white. Primaries faded ochrey with the lines white. S. t. space narrow, constricted by the broad white s. t. line opposite the cell. Reniform long, discolorous, defined, extended inferiorly; orbicular, marked. Terminal line dotted. T. p. line not so much exserted, opposite the disc, as usual. Head and thorax nearly white. Same size with its allies. This form is perhaps nearest to *Separata*, but the ground color is as pale as *Regia*, in which the subterminal space is not constricted opposite the disc, and the fine rosy purple color is very different from the faded ochrey shading on the primaries of *Coercita*.

With regard to the moths, very incompletely described by Mr. Stecker under "*Heliothis*," but not figured, I have been able to find out eight species. They belong, evidently, to different genera, and not a few of them are synonyms. *Heliothis imperspicua* of Mr. Strecker is SCHINIA GRACILENTA of Hubner; *H.*

Spectanda, Str., is ASPILA RHEXIÆ of Abbot and Smith. Other species may be referred to *Lygranthœcia*, as they are allied to or identical with species referred by me to that genus. *H. Rubiginosa* of Stecker is LYGRANTHŒCIA SATURATA Grote. This species has the same pearly look as *Marginata*, but the insect is evenly saturated with an orange or ochreous red tint which is peculiar. It is described Bull. B. S. N. S. 2, 74. *H. Ultima* of Mr. Strecker is a *Lygranthœcia* and belonging in appearance near to *Marginata*, *Thoreaui*, and *Saturata*. I have had this species formerly, but did not recognize it as distinct from *Saturata*, which varies in the wings becoming more fuscous, and the brighter saturating color less pronounced. The lines are crenulated as in *Thoreaui*, in both these species. *Ultima* shows a lunule and has a yellowish base and broad dark border to hind wings. *Saturata* has the hind wings with a more or less darker terminal shade, but they are more concolorous. In a specimen before me they are somewhat pale, nearly unicolorous; beneath the markings almost obliterate and, as I described them, "whitish, thickly powdered with orange red." Mr. Stecker has also described LYGRANTHŒCIA MESKEANA, under the name *Fastidiosa*, among his new species of "*Heliothis*." Mr. Neumoegen has kindly allowed me to see another of Mr. Strecker's species of "*Heliothis*." This is *Inclara*, which is an apparently valid form resembling *Atrites*, and belonging to the group of *Tuberculum*. Finally Mr. Strecker's *Regia* is a handsome, previously undescribed, form, different in color, but, apparently, related to *Coercita* and the pale forms, viz., *Separata*, *Acutilinea*, and, perhaps, *Walsinghamii*. I have also referred *Heliothis Sulmala* of Strecker as a synonym to EULEUCYPTERA CUMATILIS. Thus, of eight species described by Mr. Strecker, I would refer none to *Heliothis* proper, while five are synonyms. It is certain that Mr. Strecker's work in the Noctuidæ is of such a nature that its publication must be always a matter of regret from a scientific point of view. From his want of information as to structure, he gives no characters that can be used to eke out his descriptions, while in the moths, which are usually difficult to describe, such data are often of more value for identification of species than color and markings.

Mr. Strecker's work is, on the whole, of such an indifferent character that I am unwilling to criticize it. He has made proportionately more and more unexcusable synonyms than any other writer, and his slovenly descriptions and confessed unacquaintance with structure place him on a level with the worst amateur who has "coined" a "species." In vulgarity and misrepresentation he is, fortunately, without a rival. No amount of "industry" or "facility with the pencil" can condone his conduct.

The translation of Nature into human speech and thought has a history of its own, involving all springs of human action. We should be interested in purifying its ethics and showing a

high and simple behaviour in the recognition and publication of the class of facts with which we deal.

HELIOTHIS INTERJACENS.

This form, described by me in the Bulletin of the Brooklyn Ent. Soc. 3, p. 30, is only the Western form of *Phlogophagus*, as I am satisfied from an inspection of more, and a re-examination of old, material. The type is ochreous, almost without markings, and looks like some specimens of *Armiger*, but the angulated median shade is decisive. Others are more marked until we have a form like the typical *Phlogophagus*, but still with a faded ochrey ground color. A specimen from Havilah nearly loses this distinction. It is possible that *Luteitinctus*, with yellow hind wings, is a form of *Phlogophagus;* equivalent to the European *Maritima*, which is considered by some to be a form of *Dipsaci*, the species which, in Europe, represents *Phlogophagus*.

SPRAGUEIA FUNERALIS. n. s.

This is a distinct species, allied to *Pardalis*. The fore wings plumbeous black, glistening, as are the concolorous fringes. A large pale yellow costal spot, outside the t. p. line. The wing is crossed by two pale yellow median bands, the outer widening at costa. The outer band is edged with ochrey inwardly inferiorly, and includes a costal dark speckle in the wide portion of the band, which is only a large costal blotch into which the band merges. Inner band edged outwardly with orange or ochrey. Thorax cupreous. Hind wings blackish with blackish fringes. Size of *Pardalis*, differing by the deeper yellow and larger costal blotches, also by the unicolorous black fringes. A number of specimens in Mr. Neumoegen's collection. This species is remarkable for the lustre of the plumbeous black wings.

CATOCALA COMMUNIS. *Grote.*

The figure of Abbot of *Neogama* has the secondaries bright yellow, but the black band is constricted above the middle as in our Northern form, *Communis*. Our specimens vary in the darker or paler primaries, but the paler form, with the subterminal space decidedly brown, is the typical *Communis*. The reniform and the sub basal space are also shaded with ochrey brown. The abdomen, like the hind wings, is more yellow in the Southern specimens of *Neogama*, which is, like *Communis*, a comparatively more robust species with shorter wings than *Subnata*. Whether this Southern form, the true *Neogama*, which has less brown on primaries, be distinct from our Northern form, which is Guenée's *Neogama*, I know not. But in no event can *Communis* be cited as a simple synonym, especially in these days when the varieties are all being named. It is extraordinary that in Mr. Hulst's paper my species are generally called "varieties," and my varieties, "sub-varieties," or even degraded to simple synonyms. In all this there is no question of advancing science, because in those cases where Mr. Hulst is confessedly ignorant of the form

described by me, I am never given the benefit of the doubt. I understand, though I have seen nothing in print, that Mr. Hulst has had "light" in some of these cases. What will be always amazing is the courage which enabled Mr. Hulst to write as he did while he was so much in the dark.

CATOCALA CHELIDONIA. n. s.

♂ ♀. This species is allied to *Formula* by the straightness of the t. p. lines on the fore wings. It differs by the course of the lines in detail, by the large size and different color of the primaries. Fore wings even dark fuscuous gray, somewhat hoary, the lines not very distinct. Reniform shaded with gray; subreniform independent, stained with brown. The sub-costal teeth of the t. p. line more prominent than in *Formula*. The line is regularly waved and runs nearly straight to internal margin below the two prominent discal teeth. Hind wings dark yellow. Exterior band interrupted. Median band rather narrow, swollen on disc, angulated opposite the interruption of marginal band, not reaching internal margin. Some dusky hairs at base. Beneath, with wide blackish borders, the centre of wings dark yellow; band of hind wings repeated. Numerous specimens of this very distinct form in the collection before me. *Expanse*, ♀ 45, ♂ 47 mil.

CATOCALA SIMILIS. *Wm. H. Edwards.*

I have originally referred this as a variety of *Gracilis*, on the strength of specimens, named by Mr. Edwards, in his own and in Mrs. Bridgham's collection. But I have seen since a specimen of *Formula*, labelled by Mr. Edwards as *Similis*, in Mr. Saunders' collection. I am now confident, from a quite recent re-examination of the original description, that it fits *Formula* better than any form of *Gracilis*. It may be that Mr. Edwards has confounded the species subsequently, if not at the time of description. But, in any event, I restore to *Similis* its undoubted right. The species must be known as *Similis*, with *Formula* as a synonym. I have identified now all the species described by Mr. Edwards in Proc. Ent. Soc., Phil., 2,508. They are all valid except *Parvula*, which is a suffused form of *Minuta*. *Gracilis* also has a suffused variety, both in the typical form and in the very distinct darker and hoary variety which I have called *Sordida*. My identifications of the Eastern species of *Catocala*, including *Grynea*, have been generally accepted; and, with all the new species recently described, those described by Guenee, which I could not make out, in 1872, remain still unidentified.

The publication of a paper on the species of *Catocala*, by a clergyman, the Rev. Mr. Geo. D. Hulst, in the Bulletin of the Brooklyn Entomological Society, obliges me to notice its contents briefly. The criticism that I make on this paper is, that its publication was entirely unnecessary from a scientific point of view. This may be substantiated by the fact that every change

in that paper from my "List," or my original "Revision," Tr. Am. Ent. Soc. 4, 1872, can be shown to be superfluous or erroneous, and often made without a knowledge of the species discussed. Neither from the literary or biological point of view did the author possess sufficient information to warrant his writing extendedly upon the subject.

In a somewhat lengthy preamble, in which I find nothing original which is at the same time important, Mr. Hulst likens the present knowledge of the species of *Catocala* to a diseased infancy. In this Mr. Hulst confounds the state of his own mind on the subject with that of others, an error often committed and difficult to guard against. In the course of his remarks, Mr. Hulst notices the fact, alluded to by other writers, that certain species of *Catocala* approach each other, while separable by the color of the hind wings. Mr. Hulst cites the example of *Illecta* and *Concumbens*, originally given by myself. But he adds to them the species *Zoe* and *Ilia*, as affording a parallel case. Now these last two do not differ by the color of the secondaries, except so slightly as not to warrant the remark, and agree so closely in other respects, that it is perhaps doubtful if they are distinct species. The orange and yellow species cannot be separated under distinct groups, as these colors are not always constant in one species. I may cite *Verrilliana*, which varies from the type, in which the hind wings are brick or orange red, to var. *Ophelia*, where they are purely red or crimson and to a variety from Arizona where they are yellowish. Again Mr. Hulst cites *Cerogama* and *Relicta*, but these two are not at all nearly allied. *Relicta* belongs to the sub-genus *Catocala*, as restricted by Hubner, and I have originally shown, in the pages of the *Popular Science Monthly*, that our form has a few blue scales on the white band, and thus light is thrown on the probable common origin of our form and the European *Fraxini*.

I will now substantiate my remarks by going over the points made by Mr. Hulst, in which he differs from my List. In all of these he agrees with Mr. Strecker, and thus I am led to ascribe Mr. Hulst's venture solely to a desire to forestall opinion in favor of Mr. Strecker. It is known that one of Mr. Strecker's numbers was ante-dated "August," while not issued until November. The reason for this offense was that Mr. Strecker therein re-named certain of my species published by the American Entomological Society in September. In this way Mr. Strecker hoped to secure the recognition of his names. But it is not the only attempt of Mr. Strecker to secure for himself priority. Another writer has convicted him of similar work in the Butterflies, see Can. Entom. p. 76, 1878, where Mr. Strecker's methods "can scarcely be called honest."

The statement made by Mr. Hulst, that he "'attempted to get at the truth" of the matter, is very singular, seeing that he

only consulted Mr. Strecker and took his version without letting me know anything about it, or investigating the facts I could have furnished. One of the first things to be done, if it was intended to get fairly at the facts, was to procure the statements of the principals. But Mr. Hulst, though he had sent me some specimens to determine at that very time, never informed me that, in his forthcoming paper, he was to announce himself as "compelled to judge" between Mr. Strecker and myself. It is of a piece with Mr. Hulst's descriptional work, that he dislikes to consult the necessary authorities. This "judge" gives a wonderful series of "reasons" for condemning me unheard, but the whole have the air of an arrangement between Mr. Strecker and the "judge," which detracts from the solemnity and impartiality of the proceedings. As a specimen of these reasons under which my three species are to be overthrown to rise again under Mr. Strecker's sponsorship, I will repeat one or two of Mr. Hulst's statements. Mr. Hulst prefers, for instance, the name *Amestris*, to *Anna*, on the ground, "that" one is "strictly Catocaline (?), while" the other is "not." It appears from this that "Catocaline" is a new euphemism for loose behavior, and that the Rev. Mr. Hulst approves of the names of Swinburne's heroines being applied to a group of moths whose conduct is no worse, so far as I have observed, than their neighbors. To prefer the "strange woman" to a prophetess, is singular taste in a clergyman. And then Mr. Hulst clearly states that "Mr. Strecker's names were given prior to those of Mr. Grote," and in the next sentence qualifies it singularly and suddenly by the words: "Presumably so;" and then proceeds with his special pleading. "On the face of it," Mr. Hulst says, that Mr. Strecker is earlier. The "face of it" reads "August," but it ought to read "November." As I do not claim any earlier date than "September," why is all this argument given to support Mr. Strecker? The "gentlemen" who saw Mr. Strecker's "proof sheets in August," have, I am told, either disappeared or altered their minds. If Mr. Strecker did not date his number "August" in order to deprive me of priority, what did he do it for? Mr. Hulst says Mr. Strecker's claim has "every evidence of truthfulness." Well, it can be positively proven that the matter which Mr. Strecker dates "August" could not have gone into the printers hands before "October." For Mr. Hulst's sake Mr. Strecker ought to come forward and deny this and prove his date of "August."

It will be seen from the above that Mr. Hulst's "reasons" are to far fetched to be accepted, and that he is not a fit "judge" in the matter. I cannot, perhaps, successfully appeal from his decision, prejudiced, to Mr. Hulst unprejudiced, but I have collected what outside evidence I can now find and given it to Mr. Hy. Edwards, who, from his own particular

knowledge, is better fitted to settle the matter fairly than anyone else to whom it is of any importance. In coming to an opinion in the matter, Mr. Hy. Edwards will at least possess the advantage of knowing all that can be said on both sides.

The more difficult work in the genus was the identification in our Collections of the species described by the older writers, and then by Gueneé and Walker. This was brought together in 1868 to 1872, when the collection of the American Entomological Society was determined by myself. None of my determinations have been since changed, notwithstanding the amount of wisdom rapidly developed by Mr. Strecker after the publication of my paper and the opportunity of examining that collection presented itself. Yet two species recognized by me at different times, the *Illecta* and *Nuptialis* of Walker, were re-named by him. At this day, when the original French and English descriptions are not taken in hand, and the difficulties of the earlier students are surmounted by the adoption of their determinations, little thought is given to the labor that was necessary in order to afford a safe basis on which new species could be recognized and described. In the present case the labor was not done by Mr. Strecker, although from the way in which Mr. Hulst speaks of him one would infer that he had performed a great deal of hard work in the genus, in every way. He simply had to pick out from the fresh collections then coming in from all parts of the country, the new species not represented in the Philadelphia collections, and he commenced by suppressing a MSS. name of mine for his *Obscura*, a name which, I am afraid, is not *Catocaline* enough for Mr. Hulst's ear. But, although Mr. Strecker has furnished some hastily drawn and colored plates, he has not advanced the knowledge of the genus beyond the new species. He has not cleared up any of the doubtful points as to synonomy, but has added plenty of his own. He was not able to separate the sexes of *Relicta*, and, after indulging in many remarks as to the insufficiency of descriptions without figures, he described several species with less detail than any other author, and gave no figures of them. Yet such has always been the success of illustrations, that his have stood in the stead of serious work, and have conferred upon Mr. Strecker a reputation which cannot remain when the facts are seriously considered and weighed. The reputation that will undoubtedly permanently appear as the result of that action of Time which Mr. Strecker is so fond of anticipating, can hardly be of a desirable nature, unless the standards of good conduct and good taste, to say nothing of good scientific work, change decidedly from what they are at present.

But to return to Mr. Hulst's paper and his course with the described species of *Catocala*.

I feel sure that *Alabamæ*, from Alabama and Florida, is quite distinct from *Grynea*, to which Mr. Hulst unites it, without even

knowing the species. The idea that *Præclara* is a form of *Grynea* because the specimens "bear in number a certain regular percentage to specimens taken of *Grynea*," is unique as a reason for their identity. The notion that *Abreviatella* and *Whitneyi* are varieties of *Nuptialis*, I must totally dissent from. *Cœlebs* is united with *Badia*, because Mr. Strecker has expressed the opinion. But it has since transpired that Mr. Strecker did not know *Cœlebs*. He pronounced specimens of it, which were sent to Mr. Hy. Edwards by Mr. Allen, from Maine, to belong to a "new species." Of course, Mr. Hulst follows suit.

Flavidalis is not a synonym, but a well-marked variety of *Innubens*. The hind wings are yellow. A rumor has been circulated that my types were baked specimens, and that the color was changed in this way. It is not so. They came from different localities, are, moreover, perfectly fresh, and Dr. Bailey, who has critically examined them, is of this opinion. After the primaries, the hind wings above are found most subject to variation. *Communis* is not a synonym of *Neogama* of Abbot & Smith, as which Mr. Hulst refers it, without remark. Southern specimens agree with Abbot's figure in the hind wings being light yellow; in the Northern form, *Communis*, they are dusky buff yellow. *Meskei* is quite different from *Uniguga*; that they are the same is one of Mr. Strecker's ideas. I believe that Mr. Hy. Edwards has published his opinion that they are readily distinguishable and are probably different species; I feel certain that they are. *Residua* is more distinct from *Insolabilis* than any two black species in the same sub-group. There is no shadow of reason to consider them the same, and I have heard that the larvæ are now known, and found to be quite different. *Arizonæ* is cited as a synonym of *Walshii*, but the latter is not found in Arizona, and the two are, at least in my opinion, different; as before stated (compare desc.), I believe *Aspasia* is a redescription of *Arizonæ*.

My type of *Arizonæ* went to Philadelphia, and, I believe, was in Strecker's hands after "*Aspasia*" was described by him. Compare his brief description of the latter; both he and I compare the new form with *Amatrix*. I certainly knew *Walshii*. *Beaniana* is not at all related to *Briseis*, nor is *Semirelicta*. The latter is near Mr. Hulst's *Pura*. It was a happy stroke and worthy of the disciple of Mr. Strecker to refer *Semirelicta* as a var. of *Uniguga*, and remove *Pura* to some distance as a distinct species. Our author could not have studied the literature of his subject, from his uniting *Cratægi* and *Polygama*, with Mr. Saunders' description of the distinct larva of *Cratægi* on record. If this paper was known it ought to have been alluded to. The imagos of *Polygama*, *Pretiosa*, *Cratægi* and *Mira*, are quite easily separable. *Mira* has been collected in large numbers by Professor Snow; it is, beyond question, a separate form, not being as near any of the three as they are to each

other. It is improbable that Mr. Hulst knew these. While good species are thus referred as synonyms or varieties from no reason that can be called scientific, undoubted varieties are called distinct species by Mr. Hulst, who thus catalogues *Gisella*; and as to *Herodias*, he does not note that it may be a form of *Ultronia*. In conclusion, it is difficult to speak seriously of the paper; it turns the very sequence of the species upside down, and it is to be hoped that it will be forgotten for the sake of the science which it has in no way advanced.

It will at once appear that my remarks as to the absence of anything really new and valuable in Mr. Hulst's paper are warranted, when I state that not one of the synonymical difficulties in the genus left unsolved by me in the "Revision" are cleared up. Mr. Hulst knows only the species I there identify, and certain subsequently described ones. Guenee's species, unidentified by me, are equal mysteries to him. It is improbable that Guenee has even been consulted by Mr. Hulst. Certainly my collection was not examined. It is clear that there must have been some other than a scientific reason for the appearance of Mr. Hulst's paper; but, whether I am right or wrong in this belief, the fact is not altered that there is nothing in the paper, outside of the championship of Mr. Strecker's views, that excused its writing, and certainly nothing that justified its publication.

The species of *Catocala*, which I have described, and which in most cases renewed examination or fresh material convinces me I have been correct in considering as distinct, are as follows:

Retecta, *Robinsonii*, *Flebilis*, *Levettei*, *Residua*, *Angusii*, *Arizonæ*, *Coccinata*, *Meskei*, *Semirelicta*, *Verrilliana*, *Snowiana* (*?*), *Adoptiva*, *Communis* (*?*), *Subnata*, *Piatrix*, *Habilis*, *Coelebs*, *Badia*, *Anna*, *Clintonii*, *Abbreviatella*, *Frederici*, *Mira*, *Alabamae*, *Praeclara*, *Dulciola*, *Fratercula*, *Chelidonia*—29 species.

The varieties, which are all sufficiently pronounced as to be worthy of a name, are as follows:

Simulatilis, *Flavidalis*, *Scintillans*, *Phalanga*, *Sinuosa*, *Bunkeri*, *Basalis*, *Westcottii*, *Sordida*, *Lineella*—10 varieties.

It is possible that *Snowiana* may be a variety of *Neogama*, but the type differs from any Kansas *Neogama* yet seen.

The synonyms which I have myself discovered in the course of my studies and announced are as follows:

PONDEROSA, FORMULA.

Were we to follow the examples of Guenee and other European authors of note, these names would still obtain as replacing others preoccupied in the family.

With regard to the species re-described by Mr. Strecker under the date of "August," whereas the publication was not received until November 12, I have shown that Mr. Strecker placed a false date, and have exposed his motive for doing so. Mr. Strecker publishes his own descriptions, whereas I had

nothing to do with the printing of mine, which was done in a distant city by a scientific society. My "extras" were in the hands of correspondents some time before Mr. Strecker's number appeared. The date my article bears is the date given by the society, and for which it is responsible. It rests with Mr. Strecker and his friends to attack the American Entomological Society to disturb its dates. As a matter of fact, my paper was printed first, but it is enough for me that the society's signatures give the date before that on which Mr. Strecker's number was issued. The American Entomological Society will be able to defend its method of printing its Proceedings, which is intended to protect students who place their papers in its hands from just such attempts as Mr. Strecker's. But I have shown the justice of my case as far as it is possible for me to do when I prove the real date of Mr. Strecker's irresponsible publication. If a scientific society then shows by its signatures that my paper is printed before the corrected date of issue of my contestant, there can be no doubt that my names have priority, and Mr. Strecker's attempt to deprive them unlawfully of their advantage should meet with the fate it deserves.

I am spared much by Mr. Strecker's own admission in a later number, under "Notes," that my paper is dated September. This statement is accompanied by one of his own, that his publication of the species was "printed August." This is absolutely false, and if Mr. Strecker will challenge the statement the proof is ready for him. The man who openly advertises that he "covets" specimens may not be sensitive to shame.

HOMOPYRALIS REPENTIS. n. s.

♂. This species looks like a small *Homoptera*, but the palpi are projected and pointed. It is about the size of *Discalis*, but the four wings are of a paler brown, with less of the dark suffusions and shadings of either *Discalis* or *Tactus*. This latter is the type of the genus, and appears to have a wide distribution along the Atlantic coast. Mr. H. B. Moeschler records it from Guiana, and says also that he has received it from the West Indies. The new species, *Repentis*, has the lines fine, black, cleanly marked. The outer or transverse posterior line, commences at apical third, and forms two undulations opposite the cell, running in very strongly at the middle of the wing, to below a black, moderate, upright, solid, discal mark, the reniform spot. Thence it runs unevenly, near the median shade, to internal margin. The median shade is diffuse. The inner line is uneven, black, not arcuate, with a superior inward sinus. The base of the wing and the sub-terminal space are a little darker than the rest. The sub-terminal line is indistinct, threadlike, uneven, and is inaugurated at costa by a thicker black streak, which contrasts very strongly and appears to run at variance with the course of the line itself. The fringes are alternately darker and paler brown. The secondaries are

more dusky brown. There is an angulate inner black line, not reaching the costal margin, and followed by a finer line. Then there is a thick, black, extra-mesial line also expiring much before the costal edge. There is a fine denticulate sub-terminal line edged with pale or whitish and followed by a reddish shade. A black, terminal, continuous line before the fringes. The body is light brown, with a dusky edge to the collar. Beneath the markings are effaced, the lines feebly marked.

There are now four species of this genus from our territory, described by myself. *Tactus* and *Discalis* I have collected in New York State. The latter is larger than *Tactus* and has a reddish discal stain on secondaries. *Repentis*, the new species, is from Arizona, and *Tantillus*, the smallest and darkest form, has been collected in Texas by Mr. Belfrage.

The genus is evidently lower than Homoptera, and prepares us for the Deltoids. The further south we go, the more do we find the forms increase in abundance which belong to the *Fasciatæ*. Their resemblance to the *Geometridæ*, is shown by the similarity in the ornamentation of the upper surfaces of the wings. In the typical *Noctuidæ*, the secondaries are unbanded, as a rule, and their upper surfaces resemble the under surface of the primaries, in their want of markings and more faded tone. In my arrangement of the genera of the *Fasciatæ*, I have been guided by the tendency towards a similarity of marking on the upper surface of the wings, and also in the shape of the primaries. These become more unlike the typical *Noctuidæ*, and, in their different proportion and sharpness of apices, also affect the *Geometridæ*. The Deltoids in their neuration are *Noctuidæ*, in the ornamentation and length of palpi, frequently also in their glistening surfaces, they are like the *Pyralidæ*. That they are an aberrant group seems to follow from the diversity of structure which they show. The feet have an unusual structure in some genera, in others the antennæ. Some of the lower genera of the *Fasciatæ* (e. g. *Sylectra*) resemble them in this. *Mirandalis* has very curious antennæ. I recorded the fact that I took a specimen of this curious moth at the Battery, in this city, about twenty years ago. It may have been brought in a vessel. The migration of the moths up the Atlantic coast has not been sufficiently studied. As a rule, there is a seasonal migration from the south, northwardly.

MEGACHYTA SUBFLAVIDALIS. n. s.

♀. Resembles *Lituralis*, in the presence of the two black costal spots which inaugurate the median lines, but the inner line is outwardly oblique and even. The lines themselves, below the large costal spots, are faint, ochrey. The wings are pale gray, shaded with ochrey terminally. The outer line is thick, sinuate. Reniform an upright ringlet. S. t. line dotted, undulate. Secondaries stained with ochrey, the inner line wanting. S. t. line denticulate. A terminal dotted line on both wings; fringes con-

colorous. Beneath stained with yellowish. Discal marks and the sub-terminal and terminal lines indicated. Head and thorax gray. *Expanse* 25 mil.

Much paler and more simply marked than *M. Lituralis.*

CYMATOPHORA (BOARMIA) PULMONARIA. n. s.

♀. Very large and dark, related to *Umbrosaria.* Dark, blue gray, a wide, blackish, angulated shade within the inner black median line and following its shape. Median shade narrow, scalloped inferiorly, diffusely marked on costa. Outer median line followed by a diffuse, irregular black shade. Sub-terminal line whitish, contrasting. A reddish longitudinal shade from base to s. t. line, above internal margin. Secondaries with discal dot and the lines and shades of forewings continuously repeated; external margin slightly uneven. A faint, black, interrupted, festooned terminal line and fringes pale gray on both wings. Beneath, pale whitish gray, immaculate, strangely contrasting. Body above dark gray, below, pale. *Expanse* 42 mil.

The generic location of this fine species will be uncertain till we know the male.

PHASIANE COLATA. n. s.

Size of *Snoviata.* Gray with transverse strigæ. The primaries have three transverse brown lines, marked on costa, the basal one continuous, but the others faintly marked; but the whole wing is covered with fine hair lines, more or less continuous. Before the white sub-terminal line the wing is stained with ochreous. The terminal space is very much darker than the rest of the wing. Two apical costal dots. The gray fringes have a white basal line on both wings. A dotted black terminal line on primaries. Beneath gray, the hind wings mottled. Primaries with an ochrey shading. Secondaries gray, without prominent markings. Body gray.

PHASIANE HYPAETHRATA. n. s.

♀. Thorax, base of primaries and terminal space, outside of t. p. line, blackish brown. Median space clear, light, buff yellow, including a discal dot, and the costal margin with some dark speckles. Apices shaded with fulvous. Interior line black, arcuate. Outer median line angulate opposite the cell. Sub-terminal line feebly indicated by some white scales. Secondaries light brownish, irrorate. A faint mesial line and discal dot. Abdomen light brown. Beneath light brownish, reflecting the marks of upper surface, irrorate and strigose; the discal dots repeated. *Expanse* 27 mil.

Very different from the described species. It curiously resembles the extreme variety of *Zanclognatha laevigata*, described by me, on account of the yellowish contrasting median field of the forewings.

BOTIS CROCOTALIS. n. s.

This species is entirely of an orange brown, concolorous, body

and both pair of wings. The body beneath and base of palpi pure white. It is immaculate and of the size of *Ventralis*, but it is nearer to the group of *Fodinalis*. Several specimens have been seen by me.

EURYCREON ELAUTALIS. n. s.

♂ ♀. This species has the clypeus prominent, embossed ; the infra-clypeal plate exserted. The pattern is not unlike *Rantalis*, but the hind wings are more transparent and the bands on fore-wings angulated. Fore wings pale ochrey yellow. Anterior line outwardly oblique, uneven, shaded before with fuscous. Reniform indicated. Outer line uneven, angulated opposite the cell, followed by a fuscous shading over sub-terminal space. The s. t. line indicated and with a deep sub-median sinus. No terminal line. Fringes whitish. Hind wings white, with a denticulate extra mesial line, outside of which the wing is washed with ochrey. Fringes white. Head and thorax ochrey. Beneath paler, the markings faintly refletced. *Expanse* 22 mil.

I have examined a number of examples, some less distinctly marked than others.

NOTES ON SOME NORTH AMERICAN LEPIDOPTERA

BY A. G. BUTLER.

(*Concluded from page* 132.)

In the present part of my paper I offer a few remarks on the Noctuites forwarded to us by Mr. Edwards.

With the Noctuites of North America I have hitherto had very little to do ; but I wish to take advantage of the present opportunity to call the attention of Lepidopterists in the New World to the true affinities of this tribe of Moths.

A study of the ontogenetic development of the Noctuites shows that they are in all probability descended from the Geometrites ; that their ancesters were "loopers." It is therefore very important in a classification of the genera of Noctuites to place those genera in which the looper-like character is retained longest (*i. e.*, the typical semi-loopers) next to the Geometrites, and those in which it is soonest lost at the opposite end of the series. I cannot myself attempt to do this with the few species here enumerated, more especially as I could only guess by analogy what the larvæ of some of them would be like, but there can be no question that a study of the earliest larval stages (suggested by Weissmann) will throw a flood of light upon the true affinities of this somewhat perplexing group.

It should also be borne in mind by breeders of Leipdoptera that the adult larvæ of the so-called *Bombycoidæ* exhibit the characters of *Liparidæ*, *Arctiidæ* and *Notodontidæ* as well as those of typical Noctuites (and that on that account I have distributed

several of the genera among these families), yet an examination of the earliest stages would alone satisfactorily decide whether the species and genera associated under this family are in reality allied to the Bombyces or not; they have probably been placed in this tribe on account of their well-developed proboscis (though many of the *Arctiidæ* are almost equally well furnished in this respect, and though the stress laid on this character, if applied to the *Sphingidæ*, ought to separate the *Acherontiinæ* from that family); as to their somewhat vague resemblance in the imago state to *Xylinidæ* and one or two other families of *Noctuæ* that is in my opinion quite unimportant.

Lastly, it is worthy of consideration whether the smooth larvæ of the true Noctuites ought to be widely separated from the similarly smooth larvæ of the *Sphingidæ*, and separated moreover by the interposition of a vast assemblage of hairy coccoon-forming, woolly looking moths like the *Arctiidæ*, *Liparidæ*, *Lasiocampidæ*, *Saturniidæ*, *Limacodidæ*; although the last two families in their smoother, though eccentrically formed larvæ, are apparently nearer to the Noctuites than the others.

Considering the almost hopeless chaos in which the classification of the Hetercerous Lepidoptera has lain up to the present time, it seems to me to be most important that all these points should be well ventilated and definite conclusions arrived at.

Respecting the genus to which the first two species are referred, I personally have some doubts, they are so extremely like the *Apamea connexa* and *A. unanimis* of Europe in pattern and general coloration, that had I received them unnamed I should unhesitatingly have referred them to that genus; nevertheless the study which Mr. Grote has devoted to the types of the obscurer genera in this tribe makes me cautious of offering any decided opinion until I have had time and opportunity to examine the matter thoroughly, as he has done.

APAMIDÆ.

MAMESTRA CINNABARINA. *Grote.*

Washington Territory.

MAMESTRA CUNEATA. *Grote.*

California.

NOCTUIDÆ.

AGROTIS REPENTIS. G. and R.

This species appears to belong to the same section of the genus as *A. Impacta* of Venezuela.

AGROTIS HAVILAE. *Grote.*

I should have placed this species next to *Spælotis Ravida* of Europe which it much resembles.

ORTHOSIIDÆ.

ORTHOSIA CRISPA. *Harvey.*

This is almost intermediate between *O. lævis* of Europe and *O. lizetta* of Japan; it is rather larger than either.

HADENIDÆ.

HADENA INDIRECTA. *Grote.*

Seems to belong to the *H. convergens* group, and to be allied to the "*Xylophasia*" *mucens* of Walker's List.

HELIOTHIDÆ.

MELICLEPTRIA OREGONICA. *H. Edwards.*

Summit of the Sierra Nevada.

We have nothing closely resembling this species in the Museum.

MELICLEPTRIA DIMINUTIVA. *Grote.*

Knight's Valley, California.

This little species has a singular resemblance to the Pyralidian *Noctuomorpha normalis* of Europe.

XANTHOTHRIX RANUNCULI. *H. Edwards.*

Havilah, California.

This species belongs to a genus which is quite new to me; two very distinct forms (which I should have supposed to be specifically separable) were sent by Mr. Edwards.

PHALÆNOIDÆ.

It appears to me that the genus Annaphila would be more appropriate here than in the *Anartidæ*. A comparison of the two species hereafter noted with *Anarta*, shows that the secondaries are conspicuously broader than in that genus whilst the coloration is similar to that of *Archiearis*.*

ANNAPHILA DEPICTA. *Grote.*

Sonoma County.

ANNAPHILA DECIA. *Grote.*

Havilah.

PLUSIIDÆ.

PLUSIA CALIFORNICA. *Speyer.*

Kern Co., and Havilah, California.

I found two examples of this species in the Museum collection from Vancouvers' Island, under *P. gamma.*

PLUSIA BRASSICÆ. *Riley.*

California.

This agrees in every respect with our examples of the European *P. U. aureum* of Guenée. I cannot regard it as a distinct species.

PLUSIA DYAUS. *Grote.*

Indian River, Florida.

An example of this species from Orilla was amongst our specimens of *P. precationis*. It is extremely close to the widely distributed *P. verticillata*, which should, I think, stand between it and *P. precationis.*

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* The genus seems to me related to *Eustrotia* (*Erastria*) A. R. G.

BOLINIDÆ.

SYNEDA DIVERGENS. *Behr.*

Truckee, California.

The *Euclidia Capiticola*, of Walker, and *E. petricola*, come near to *S. divergens.*

LITOCALA SEXSIGNATA. *Harvey.*

Colorado.

CATOCALA AHOLIBAH.

Vancouvers Island.

This species is also in the British Museum, from the same locality. With it we received what appears to be a very distinct species of the same group.

CATOCALA IRENE. *Behr.*

Mendocino, California.

Allied to *C. Electilis*, of Mexico, but the coloration of the primaries more like that of *C. innubens.*

CATOCALA CALIFORNICA. *W. H. Edwards.*

The nearest species to this, in the Museum, is a larger and undetermined *Catocala* from Texas.

CATOCALA MARIANA. *H. Edwards.*

Seems to come nearer to *C. briseis* than anything else in our collection. The latter was wrongly identified by Walker as the *C. parta*, of Guenée (Lep. Het., p. 1193).

CATOCALA VERRILLIANA. *Grote.*

Humboldt Co., California.

Quite new to me.

EUCLIDIIDÆ.

EUCLIDIA CUSPIDEA. *Guén.*

Knight's Valley and Havilah, California.

Smaller and with more sharply defined markings on secondaries, than in our examples.

A NEW AND REMARKABLE BOMBYCID MOTH FROM ARIZONA.

BY HENRY EDWARDS.

EULEUCOPHÆUS NEUMOEGENI. n. s.

♂. Head white, with a few blackish hairs intermixed, the palpi bright reddish brown. Thorax snow white, with a central black band. Antennæ orange brown. Abdomen with deep claret brown at base, shading towards the anal extremity into orange brown. Beneath it is reddish brown at the base, white on the middle and blackish on the posterior segments. The legs are all reddish brown at their base, the tibiæ snow-white edged with black, and the tarsi jet black. Primaries and secondaries snow-white, the former with the anterior line rather narrow, nearly straight, jet black. Upon it, above the median nervule, rests a pale orange transverse dash,

surrounded by black. The discal mark is also pale orange, almost oblong in shape, and surrounded by black band. The posterior line is almost parallel with the margin, slightly sinuate, dentate about the middle, and continued in the same form on the secondaries which are slightly more transparent than the upper wings, bearing also a pale orange discal mark surrounded with black. The under side has the markings of the upper distinctly repeated. In one of the two ♂ examples before me there is a bunch of lemon yellow hairs at base of the primaries beneath, and the same color is continued to the base of the legs and the sides of the lower surface of the margin. This is evidently not the result of discoloration, as the specimens are wonderfully fresh.

♀. Similar to the ♂, but a little larger, and with the four posterior segments of the abdomen, clear white, above and below, the middle segments only being narrowly edged with reddish brown. The stigmeta in ♀, are very strongly marked, jet black.

Exp. wings, ♂. 48 m. m. Length of body, 21 m. m.
Exp. wings, ♀. 62 m. m. Length of body, 27 m. m.
2 ♂. ♀. Prescott, Arizona. (I. Doll.)
Types. Coll. B. Neumoegen.

I have no hesitation whatever in placing this remarkable insect in Packard's genus, which it seems to connect in some respects with *Hemileuca*, its remarkable coloration being, however, the very reverse of the latter genus. I regard the species as the handsomest Bombyx discovered for many years in the United States, and as such it gives me unusual pleasure to dedicate it to my friend, Mr. B. Neumoegen.

It is to his liberality and boundless enthusiasm in the cause of entomology, that we are indebted for the knowledge, not only of this beautiful insect, but of many other of supreme interest and importance, and the example set by Mr. Neumoegen is in every way worthy of imitation by those who have the power to help the progress of science, not only in this, but in other branches of study. For nearly two years Mr. Neumoegen has kept an earnest and intelligent collector in the field, who has poured into the studios of entomologists unheard of treasures, many of which yet remain to be described. Such devotion to entomology is as honorable as it is rare, and should excite in the minds of all students a feeling of the deepest appreciation.

I hope in some future number to present the readers of "Papilio" with a figure of this most charming insect.

A NEW HEMILEUCA FROM SOUTH-EASTERN ARIZONA.

By B. Neumoegen.

Hemileuca Yavapai. n. sp.

♂ Head and appendages and joints of antennæ dark, rusty brown. Pectinations of antennæ blackish brown. Prothorax

white, with an intermixture of black hairs. Thorax of a deep maroon red, overlaid with grayish hair. Patagiæ black, overlaid with long grayish hair. Abdomen very pilose, being, as well as the male tuft, of the brightest rust red color, but having a lateral layer of blackish hair from first to fourth segments.

Beneath the thorax is rusty red and the abdomen deep black, with a sprinkling of short whitish hair on the segments. The heavy pilose covering of the upper part of the abdomen and the anal tuft overlapping the sides, giving it the appearance of a heavy rust red fringe. Legs black, femora heavily furred with rusty red and the tibiæ having a light black and white hairy tuft.

Primaries opaque brownish black, the costa and fringes being concolorous. The space near anterior margin sparsely powdered with white scales, hardly perceptible. A transverse, small discal spot of light yellow, surrounded by a broad black patch or ring. A transverse extra mesial band of grayish white, starting from subcostal vein and resting on submedian vein. The band is of quite irregular shape, being broadest at the space between discal spot and exterior margin, and narrowest at the intersection of median veins. The inner part of this mesial band, between discal spot and base, being obliterated and indicated only by a grayish white crescent line, just sufficient to round off the shape of the black halo surrounding the discal spot. A whitish subcostal line, commencing at base of wing, and terminating within half of the space between base and discal spot. Costa somewhat concave in the middle. All the veins crossing the mesial band appear black.

Secondaries black, opaque, with concolorous fringes. A minimal discal spot of light yellow with darker indications of a surrounding black patch.

Beneath the wings as above, the mesial band of primaries being dirty gray, and the subcostal vein of primaries, as well as the subcostal and discoidal veins of secondaries, being indicated by light yellow lines.

Expands. $1\frac{3}{4}$–$2\frac{1}{8}$ inches.

Length of body. $\frac{5}{8}$–$\frac{3}{4}$ inch.

♀. Thorax dark brown-red, heavily overtufted with black and white hair. Patagiæ with very heavy black and white tufts. Abdomen black with short grayish white hair on segments and an anal tuft of bright rusty red with an upper layer of gray and white hair.

Primaries as in the ♂, the middle of the costa also somewhat concave, the extra mesial band broader, and the sub-costal white line from base towards the middle of the wing more conspicuous than in ♂. The powdering of whitish scales between discal spot and anterior margin also more pronounced.

Secondaries brownish black with concolorous fringes. An extremely small, light yellow discal dot; its tint being nearly suffused by the darker black of its surrounding halo. An indication

of a mesial band from costa to anal angle by irregular, detached, whitish powdered spots, being smallest near apex and anal angle, and largest between first and second median nervules.

Beneath, primaries as above. On secondaries the grayish white blotches of the mesial band more pronounced and larger than on upper surface, taking irregular, triangular shapes between first, and second and third veins.

Expands 2.3-16, 2.7-16 inches.

Length of body, 1, 1.7-8 inch.

This beautiful insect is similar in its form to *H. Juno*, Pack., and *H. Diana*, Pack., but is readily distinguishable from both by the glaring red abdomen of the ♂, and the black abdomen of the ♀. Besides, *H. Yavapai* has a white sub-costal line, and other peculiarities, which do not agree with *H. Juno* (see Annual Rep. Peabody Acad. Sci. for 1871, p. 87; published April, 1872).

H. Yavapai ♀ approaches *H. Diana*, (see Rep. Zoolog. Coll. Lieut.Carpenter, Colo., 1873, U. S. Govt. Print. Off., 1875, p. 557), but is a much larger insect. It has not the conspicuous white band on secondaries, which is the salient feature in *H. Diana*, but is distinguished by the white sub-costal line.

H. Juno, *H. Diana*, *H. Yavapai*, inhabit the same zone, Southern, Southeastern Arizona and Sonora and may have a common pedigree. *H. Yavapai* is the most distinctively marked form. It has been raised by Mr. J. Doll, and of the forty ex l. examples, at present in my possession, not a single one materially deviates from the description herein given.

The habitat of *H. Yavapai* is Sierra Colorado and San Pedro river, Arizona.

Types ♀ ♂. ex l. Coll. B. Neumoegen.

MOTHS COLLECTED BY PROF. SNOW IN NEW MEXICO, WITH LIST OF EUDRIINI.

By A. R. Grote.

The following species have been sent to me by Professor Snow from his captures this year in Northern New Mexico. The species are often the same as the Texan, while some of the forms are like those described from Mexico. The dangers of collecting in that region from the Indians are yet quite considerable. Prof. Snow very narrowly escaped capture by bands of the Apaches.

Halesidota Labecula. n. s.

♂. Abdomen scarlet above, beneath and at the sides yellowish; a stigmatal series of black dots and a dorsal series on the terminal segments. Fore wings transparent, speckled with brown and clay colored scales. Five clay spots on the costa mark the inception of the transverse lines. Subterminal line, double, continued, dentate. Hind wings yellowish, transparent, with narrow brown edging.

Head and thorax pale yellowish brown. Antennæ yellowish brown, strongly bipectinate. Fore coxæ red inwardly. Legs clay colored, marked with brown, the femora stained with red within.

Expanse, 60 mil. One fresh male (869).

Larger and less yellow than *Edwardsii*, differing by the brownish thorax. The terminal abdominal marks when present in *Edwardsii* are more or less diffuse and livid.

Quadrina. n. gen.

The primaries are short and wide. The cell is very short and veins long. Median vein 4-branched, cell open, veins nearly equidistant vein, 4 from base of cell. Vein 10 out of 9, a long furcation. Abdomen untufted. Differs from *Citheronia* by the depressed apices, long, curved nervules and 4-branched median vein of primaries. Veins 6 and 7 thrown off together; 8 arising midway between 7 and 9. Median vein on hind wings also 4-branched; cell open, nervules straight and long; 4 and 5 together; 3 near 4 from lower side of vein. Costal and subcostal veins forming an accessory cell at base. Head rather broad and not as sunken as usual; thorax hardly elevated in front. Squamation and aspect of *Citheronia sepulcralis*. The cell on primaries appears closed at base by the fusion of subcostal and median veins.

Quadrina Diazoma. n. s.

♀. Antennæ pectinate to tips, brownish. The four wings nearly concolorous brownish, brighter at base, where they have longer scales. A curved, even, dark, extra mesial shade line on primaries. An uneven, broken, subterminal line. Hind wings with a reddish shade, which obtains slightly at apices of primaries. Body darker, concolorous.

Expanse, 95 mil.

The neuration of this species seems to me to be indicative of a comparatively low and old type of Bombycidæ. This is seen in the long veinlets, equidistant; the shape of the wing, the costal margin curved, depressed before apices. Without the male, it is difficult to be certain of the true position of this form. The brown color is brighter, more red tinted, brighter ochery brown at base of wings than in *Coloradia Pandora*, and altogether it is removed from that type and in several characters approaches *Citheronia*. Differs from *Gloveria*, by the larger head, broader clypeus and smoother body clothing. There is a gray mixture on the fore wings of *Coloradia* and *Gloveria*, wanting in *Quadrina*, which is a smaller insect. The pectinate ♀ antennæ separate the moth from the *Ceratocampidæ*. The shape of the wings is like *Eacles*, but on the whole the outline is more like *Hyperchiria*. While structurally remote from any described U. S. genus, it may be catalogued next to *Gloveria* for the present.

Rhododipsa Miniana. n. s.

Eyes naked. Thorax covered with narrow scales. Front full. Thorax lighter honey-yellow or orange; this color spreads over base

of fore wings. Fore wings pale smooth clay color, crossed by two broad, vague, mesial white bands. Subterminal line inaugurated by a brilliant wine-red, outwardly oblique, linear scale patch, partly resolved into about three spots. A spot on internal margin. Hind wings brilliant wine red; the internal margin yellowish; indications of yellowish mesial line and the fringes are also of this color. Beneath the disc of primaries is of the same wine-red; and the hind wings are crossed by lines and shades of the same color. Length of fore wing, 10 mil.

The markings of primaries recall *Tamila Velaris*. The fore legs are wanting in the beautifully fresh example sent me by Prof. Snow under the No. 871. Quite as handsome as *R. Volupia* Grote; the red color is very rich. This genus and *Rhodophora* contain highly colored crimson or wine red species.

Bessula. n. g.

Clypeus full. Infra-clypeal plate projecting; fore tibiæ with a claw on the inside at extremity of joint; a succession of three stout spines outside; all the tibiæ spinose. Thorax untufted, hairy. Antennæ of male simple, ciliate beneath. Eyes naked. This form differs from *Pippona Bimatris*, by the slenderer fore tibiæ which have a single stout claw-like spine on the inside; whereas in *Pippona*, which has the same characters, the joint is short and broad and there is a double spine on the inside. The fore wings are also not satiny in *Bessula*, which differs from *Antaplaga*, in the absence of the clypeal process, while in that genus the primaries are unusually produced.

Bessula Luxa. n. s.

♂ ♀. Fore wings and thorax very light, whitish yellow, almost white, hind wings white, immaculate, silky. The fore wings have a curved t. p. line of faint ochrey dots. Two faint cellular dots. A dot or two in place of t. a. line. Sub-terminal line a succesion of similar dots. All these dots are so faint that they are only noticeable in my fresh female specimen. The male, somewhat rubbed, appears almost immaculate. Beneath yellowish white. Costa and apices dusky yellowish; the s. t. line indicated over costal region as a vague, dark shaded mark.

Exp. ♂ 25, ♀ 30 mil. No. 873.

The yellow color is still fainter than in *Oxylos Citrinellus*. This species, especially the female, has a certain false air of *Pareuchaetes*.

Eudryas. Boisd.

The clypeus, wings, feet and antennæ give good generic characters in the moths. If it were necessary to show the complete want of anything like anatomical study on the part of Mr. Strecker, it would be only necessary to point to his reference of *Ciris* and *Copidryus Gloveri* to the genus *Eudryas*. The three genera *Eudryas*, *Copidryas* and *Euscirrhopterus* are abundantly distinguished by the structure of the front and of the wings. The clypeus

is smooth and the apices depressed in *Eudryas*. The clypeus has a wide and thin lengthily projected "plate," and the apices are determinate in *Copidryas*. The clypeus has a circular rough projection and the male wings are almost denuded, the apices roundedly produced, the neuration aberrant in the Cuban *Euscirrhopterus*. *Ciris* is distinguished by the pectinate antennæ and shape of wings; it is the lowest of the genera. The group is not Noctuidous, as some Continental authors seem to believe, but related to *Alypia* and *Castnia*, as sufficiently explained by Dr. Packard. I have referred the African genus *Ovios* here, in a former paper, and in my "Catalogue," I call the group *Eudriini*. The list there given is defective and should be amended as follows:

Family ZYGÆNIDÆ.

Sub-family HESPERI–SPHINGES Latreille.

Tribe *Eudriini*.

EUSCIRRHOPTERUS *Grote* (1866).

POEYI *Grote*.
Heterandra disparilis H.–S.
Cuba.

COPIDRYAS *Grote* (1876).

GLOVERI *G. & R.*
Texas; Arizona.

EUDRYAS *Boisd.* (1836).

UNIO *Hubner*.
Eud. brevipennis Stretch.
Canada to South. States; California.
GRATA *Fabr.*
Eud. Assimilis Boisd.
Canada to South. States.

CIRIS *Grote* (1863).

WILSONII *Grote*.
Texas.
LYGRANTHOECIA SPRAGUEI. *Grote*.
The specimen is paler than our Eastern examples, but seems to belong to the same species. One specimen. New Mexico.
EMPLOCIA CEPHISARIA. n. s.
♀. Aspect of *Melanchroia Cephise*. Blue black above, immaculate; the short fringes are white. Beneath black, with the base of both wings on costal region shaded with pale lake red. The collar and fore legs on the inside touched same color. Body black, as are the antennæ and legs. *Expanse* 30 mil.
In this species the primaries *above* at base show an extremely faint sub-costal shade of lake red. One specimen (868).
EMPLOCIA FERVEFACTARIA. n. s.
Above orange, with lead colored margins to the wings broken up into trigonate patches. A large triangular patch on

costa beyond the middle and another before apices. Terminal margin banded with lead color, widely above, narrowly below vein four. The lead colored fringes twice interrupted with white on the interspaces between veins two and four. Hind wings with three large marginal leaden patches, one on internal margin, another at anal angle, a third at apices. Outer edge narrowly leaden. A pale apical fleck. Beneath the markings repeated. Primaries orange; the ground color on each side of the leaden triangle at apices becoming pale. Hind wings with the orange color of upper surfaee replaced by pale clay, a basal dot, two discal dots and superposed costal mark on the pale ground color, distinct. Above these are indicated less distinctly. Wings at base touched with carmine, the costa of fore wings shaded with red. Body pale, head and collar touched with red.

Expanse 32 mil. One specimen (867).

BOTIS VOLUPIALIS. *Grote.*

A fresh specimen (No. 877). In this species the fore wings are colored like *Signatalis*, crossed by two broad clay lines. The inner angulated sub-medially; the outer broader, even, nearly straight. It differs decidedly from its ally in this respect, but is similarly sized and almost as highly colored and pretty a species. Body and hind wings much as in its ally. My original specimen came from the hills west of Denver. *Botis Augustalis* is nearer *Volupialis* than *Signatalis*, while quite different from either.

BOTIS TORALIS. n. s.

Fore wings olive yellow, with a broad terminal vinous border and a basal patch of same color. Thorax yellow olive. Head touched with red. Hind wings thinly scaled, pale fuscous. Beneath pale fuscous; apices of fore wings touched with wine color. Fringes wine-red. On the primaries, beneath, a dark s. t. band and discal mark are indicated. This species hardly looks like a *Botis*, it is similarly sized with *Ventralis*. (No. 872). *Expanse* 26 mil.

Among the species collected by Prof. Snow in Northern New Mexico are *Botis Fracturalis* Zeller (880), *Allectalis* Grote (884,-885), *Tatalis* Grote, (878). All these were described from Texas originally. There is also a specimen of *Emprepes Novalis* (881), much larger than my Texan type.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 1.] November, 1881. [No. 10.

NEW GENERA AND SPECIES OF THE FAMILY ÆGERIDÆ.

By Henry Edwards.

The study of this difficult and little known group has for some time past engaged my attention, and the kindness of many friends throughout the United States, whose generosity shall be hereafter fully acknowledged, has enabled me to become acquainted with a number of new forms. In the course of a few months I hope to be enabled to publish a monograph of the North American species, with colored figures, the difficulty and delay arising from the drawing of the plates presenting the only obstacle to its immediate production.

In the present paper I have described all the species coming into my hands which appear to me to be new to science. I shall be extremely grateful for corrections of any errors of which I may have been guilty, it being hardly possible for me to escape the commission of a few. Through the kindness of Mr. A. G. Butler, of the British Museum, I have obtained admirable colored drawings of Walker's types, the descriptions of which I have copied and added to the present paper. A plate of these species is now being prepared by Messrs. Mintern Bros., London, and will be given (if possible) with the December number of "Papilio."

I here repeat, what I have more than once said, that I shall be deeply indebted for the loan of any species of Ægeridæ, more especially from the southern, western and extreme northern portions of the continent. These shall be carefully preserved and returned as early as possible.

I have scarcely thought it desirable, in the present paper, to

give the diagnoses of the genera proposed by previous authors, as these will appear in their proper places in the more extended work.

TROCHILIUM PACIFICUM. n. sp.

Size and aspect of *T. apiforme, L.* The forewings have a blackish space at the base, and the borders and nervures of both wings are orange brown, the same color as in the European species. Antennæ, rich brown, paler at the apex. Head, with the front brown, orbits of the eyes and tibiæ pale lemon yellow. Palpi pale yellow. Fore femora and tibiæ pale yellow, bordered inwardly with black. Hind tibiæ and tarsi wholly yellow. Thorax brown on the disk, with two stripes of yellow, broadest at the base, and the tegulæ edged broadly in front with yellow. There is also a yellow spot at the base of the wings, leaving the tegulæ themselves brown. At the junction of the thorax and abdomen are some black hairs, edged with yellow. The abdomen is wholly blackish brown. Of the seven visible segments, the first is without a band, the second has a very narrow golden yellow band in front, the third a broad yellow band in front, sinuously notched in the middle, leaving the centre narrower than the sides, the fourth segment is without a band, the fifth, sixth and seventh are wholly golden yellow, with a waved mark of brownish posteriorly on the fifth and sixth. The anal segment is very long and tapering. Sides of all the segments marked with golden yellow. Underside of abdomen golden yellow for the last five segments.

1 ♂. Washington Ter. (Morrison), 1 ♀. California, (R. H. Stretch).

Types. Coll. B. Neumoegen. J. Akhurst.

The dark tegulæ and the sinuous mark on the third abdominal segment will serve to distinguish this species from *T. apiforme L.* of which it appears to be the Pacific Coast representative.

EUHAGENA. n. gen.

In many respects this genus is similar to *Tarsa* of Walker, but it differs by the proboscis being short, instead of long, by the antennæ being much longer than the thorax, and by the fore and hind wings being opaque. It may be thus characterized: Body short at base, tapering posteriorly, with long anal tuft. Proboscis short. Palpi densely clothed with long hairs, and nearly straight. Antennæ twice the length of the thorax, very deeply pectinated, except at the tip, where the pectinations seem soldered together into a compact mass. Legs long. Tibiæ with long hairs, not so long, however, as in either *Melittia* or *Larunda*. Tarsi naked. Wings all opaque, the hind nearly double the width of the fore pair.

I have dedicated this singular genus to my good friend, Dr. Herman Hagen, of Cambridge, one of the most distinguished of living entomologists, and one to whom I am under special obligations.

EUHAGENA NEBRASKÆ. n. sp.

Antennæ, thorax and abdomen deep velvety black. Thorax with white scales at the sides. Abdomen with the posterior edges of the segments with clear white bands, extending in nearly all the segments entirely around. Anal tuft with white scales. Tibiæ black at their base, the hind pair with long whitish hairs intermixed. Tarsi, unclothed, black, with minute white scales. Forewings rich dark orange, black at the base, along the costa, and narrowly so on the internal margin. Discal mark large, black, triangular. Fringes long, blackish brown. Hind wings, also, rich dark orange, the abdominal margin broadly black, and the ovate discal spot, also black. The course of the nervules in both wings is indicated by black scales. Fringe broad, blackish brown.

Exp. wings. 32 m.m.

1 ♂. Nebraska. (Mr. Austin).

Type. Coll. Cambridge Museum.

A very remarkable form, differing greatly from any other with which I am acquainted

BEMBECIA SEQUOIÆ. n. sp.

♂. Forewings with the margins all black, the costal rather broad. Hind wings with costal margin, and base of the abdominal pale yellow. Beneath, the forewings have the margins lemon yellow, as far as the discal mark, beyond this, black. Hind wings as on the upper side. Head and antennæ jet black. Palpi lemon yellow, black at the sides. Fore femora, orbits of eyes and base of wings beneath lemon yellow. Middle and hind femora black. Tibiæ, lemon yellow, bordered with black. Thorax with collar, tegulæ, two narrow dorsal lines, and a basal line, lemon yellow. Abdomen with all the segments, except the fourth, narrowly bordered with rich lemon yellow. Caudal tuft, yellow below, blackish above.

♀. Similar to the ♂, but a little larger and more robust, the abdominal band broader and better defined.

Exp. wings ♂. 24 m.m. ♀. 30 m.m.

8 ♂. 6 ♀. Mendocino Co., Calif. (O. Baron).

Very destructive to *Sequoia sempervirens*, as well as to some species of *Pinus*.

BEMBECIA SUPERBA. n. sp.

Nearly allied to *B. sequoiæ*, but more delicate than that species. Fore wings with costal margin brownish black, the internal margin and discal mark flecked with golden scales. The base and abdominal margin of hind wings are golden yellow. Beneath, with the exception of the margin of hind wings, and the posterior margin of fore wings, which are brown, the whole of the wings are golden yellow. Head and antennæ black, the latter with yellow hairs at the base. Thorax with collar and rather broad lateral and basal bands golden yellow. Abdomen black, with second segment posteriorly, and fourth, fifth and sixth

wholly golden yellow, the color extending to the under side. Caudal tuft golden yellow, blackish in the centre above. Palpi golden yellow, with some black hairs at the sides. Fore coxæ golden yellow without, blackish within. Other coxæ and femora blackish. Tibiæ and tarsi golden yellow, the former marked with black at the joints above.

Exp. wings. 30 m.m.

1 ♀. Washington Terr. (Morrison).

Type. Coll. E. L. Graef.

This may be distinguished from *B. sequoiæ* by its slighter structure, narrower body, golden scales on fore wings, and by the posterior segments of abdomen being wholly yellow and not banded.

LARUNDA. n. gen.

Antennæ moderately pectinated in the ♂, almost simple in the ♀. Palpi. short, with very broad spreading tuft of hairs. Tongue almost obselete. Abdomen very long, sessile, as wide at the base at the thorax. Caudal tuft large, flat, spreading. Hind tibiæ clothed with bunches of long hairs, especially in the ♀. Forewings opaque. Hind pair with small vitreous spot at base.

"Larunda, daughter of Almon, was the nymph who informed Juno of the connection between Jupiter and Juturna. For this Jupiter deprived her of her tongue, and ordered Mercury to conduct her to the lower world. On the way thither Mercury fell in love with her, and she afterward gave birth to 2 Lares." (*Smith's Classical Dict., page* 234.)

LARUNDA SOLITUDA. n. sp.

♂. Head and thorax brownish, collar, small tuft between the eyes, and fore tarsi pale dull yellow. Antennæ dull brown at the base and apex, deep orange in the middle. Hind tibiæ pale yellow, with bunch of orange hairs, which are brownish above. These hairs are very much shorter than those of the genus Mellittia, but are, nevertheless, quite apparent. Forewings quite opaque, dark brown, with a red and yellow shade from base along internal margin, and a streak of same colors in the cell, reaching almost to the apex, but interrupted by the discal mark. Hind wings, vitreous in the spaces between the subcostal and median nerve, and between the median and submedian, the vitreous space terminating before the centre of the wings. Margins, broadly orange red, mixed with brownish scales. Fringes of both wings, olive brown. Abdomen brownish black, with 6 broad pale orange bands, the 1st, 3rd and 5th being narrower than the rest. The 4th is broadest of all, and is carried on beneath the abdomen. Caudal tuft black, yellow in centre. ♀ Similar to the ♂, with band of abdomen, a little narrower and lest distinct.

Exp. wings. ♂. 28 m.m. ♀. 32 m.m.

♂. ♀. Texas (J. Boll.) (Coll. B. Neumoegen. ♀. Kansas (H. Brous.) Coll. C. V. Riley.)

SCIAPTERON GRAEFI. n. sp.

Entire insect purplish black, with very bright metallic reflection. Antennæ and palpi dull black. There are no traces of bands on the abdomen, and the legs are wholly concolorous with the rest of the body. I know of no other species with similar coloration.

Exp. wings. 29 m.m.

1 ♂. 2 ♀. Nevada (Morrison.)

Type. Coll. E. L. Graef, from whom I have received many courtesies, and to whom I dedicate this singular species.

SCIAPTERON SCEPSIFORMIS. n. sp.

Allied to *S. syringæ* Harris, but with the legs much shorter. The forewings are rich golden brown, a little reddish at the base and on the disk. The hind wings are very opalescent, with a rather broad purplish brown margin, the opaque portion being carried a considerable distance along the course of the median and sub-median veins. Discal mark prominent and broad, enclosing an oval vitreous space, crossed by two veins. Abdominal margin brownish orange. The wings beneath are the same as above, except that the costal margin of forewings is yellowish. Antennæ purplish brown, dark orange at the base and at the tip. Palpi and vertex dark orange. Femora dark brown. Tibiæ and tarsi orange, banded with brown. Thorax with very narrow stripes on the sides and broader ones at base, pale yellow. Abdomen brown, with 2nd segment narrowly bordered behind with pale yellow. Anal segments with yellowish shade. Caudal tuft small, as in all the genus, pale brown.

Exp. wings ♂. 25 m.m. ♀ 29 m.m.

1 ♂. 1 ♀. Texas. (J. Boll.)

Type. Coll. B. Neumoegen.

SCIAPTERON CUPRESSI. n. sp.

Allied to *Sciap. Robiniæ.*, Hy. Edw., but having the fore wings pale yellow at the base, and purplish brown along the costal margin, not concolorous as in *S. Robiniæ.* The hind wings have the abdominal margins and the base rather broadly golden yellow, the fringes of both wings being golden brown. Beneath, the forewings, as well as the margins of the hind pair, are golden yellow. Antennæ, vertex, and palpi, deep orange. Base of the eyes, pale yellow. All the tibiæ and tarsi, orange, blackish at the joints, and stained in the middle with a deeper shade. Thorax brown, with narrow lateral yellow streaks, and a broader one at the base. Abdomen with basal segment black, the second deep orange, edged posteriorly with pale yellow, the third orange in front, shading into paler yellow behind. All the other segments are deep yellow. Beneath, the abdomen has five pale yellow bands. Caudal tuft, dull orange.

Exp. wings. 30 m.m.

1 ♂. Colorado. (I. Doll.)

Type. Coll. B. Neumoegen.

The chief differences to be found between this and *Sc. Robiniæ* are: the markings of the fore wings, the much darker tibiæ and tarsi, stained with a deeper shade, and the almost wholly yellow abdomen, which in *S. Robiniæ* is blackish for the first three segments, with a narrow yellow line.

SCIAPTERON SYRINGÆ. Harr. *Larva.*

Yellowish white. Head about two-thirds the width of second segment, chestnut brown, with the mouth parts pitchy above, whitish beneath, very shiny, and with a deep triangular sulcus in front. Second segment yellowish, with a waved brownish line posteriorly. Each of the segments bears about eight short brownish hairs. The third segment is slightly broader than the rest, swollen as it were, at the sides. The spiracles are small, brown, those of the second and twelfth segment being larger than the rest. The anal segment is slightly yellow, with many short brownish hairs. All the feet and legs pale pitchy.

Length. 0.80 inch.

In stems of *Syringa Persica.* Albany, N. Y. Dr. James S. Bailey.

In young shoots of *Fraxinus* sp. Long Island. Rev. G. D. Hulst.

In young shoots of *Fraxinus* sp. Ames, Iowa. Herbert Osborn.

CARMENTA. n. gen.

Fore wings quite opaque. Abdomen sessile, and tapering toward anal extremity. Caudal tuft small. Antennæ thickened toward the extremity, as in *Ægeria* proper. In many respects this genus approaches *Paranthrene*, but in that genus, while the anterior wings are opaque, the antennæ are simple, or ciliate.

Type. *Ægeria Pyralidiformis.* Walker.

"Carmenta was the most important of the Camenæ, the prophetic nymphs belonging to the religion of ancient Italy. The traditions which assigned a Greek origin to her worship state that her original name was Nicostrate, and that she was the mother of Evander, with whom she came to Italy."

Smith's Class. Dict. Art. Camenæ.

CARMENTA RUFICORNIS. n. sp.

Fore wings bright golden purple, the golden shades arranged in streaks. Margins of hind wings also flecked with gold. Beneath, the fore wings have the costal edge bright yellow. Antennæ bright brownish orange above, with the tip black. Beneath they are brownish black. Thorax with narrow lateral and basal yellow lines, and with some pale blue metallic scales at base. Abdomen with second and fourth segments narrowly edged posteriorly with pale yellow, the sixth wholly yellow. Between the

bands are a few pale blue metallic scales. Caudal tuft black, with the centre beneath yellow. Palpi golden yellow. Coxæ, femoræ, and basal half of tibiæ steel black, the rest of the legs golden yellow, banded with black. The yellow of the legs is of a deeper shade than that of the abdominal band.

Exp. wings. 14 m.m.

1 ♂. Georgia. (Morrison.)

Type. Coll. E. L. Graef.

The reddish orange antennæ, and the blue metallic scales, will serve to distinguish this pretty species from its nearest allies, *C. Pyralidifornis*, Wlk., and *C. Aureopurpuura*, Hy. Ed.

CARMENTA MINUTA. n. sp.

Allied to *C. Pyralidiformis*, Wlk., but differing greatly in size, as well as in other characters. The fore wings are purplish, with a golden reflection. The fringes of both wings are brown. Antennæ black above, yellowish below. Collar pale yellow. Abdomen with third, fifth and seventh segments narrowly edged with pale yellow. Caudal tuft wholly black. Palpi blackish above, golden yellow beneath. Tibiæ and tarsi golden yellow, regularly banded with black.

Exp. wings. 8 m.m.

1 ♂. Georgia. (Morrison.)

Type. Coll. F. Tepper.

The smallest species of this section of the family known to me.

CARMENTA SANBORNI. n. sp.

Bronze black. Fore wings with very minute vitreous space beyond cell. Beneath they are cream yellow for about their basal half, the yellow being flecked with brown scales. Palpi, fore femora, and the posterior edge of fourth and sixth abdominal segments, yellowish white.

Exp. wings. 8 m.m.

2 ♂. 1 ♀. Andover, Mass. (F. G. Sanborn.)

Types. Coll. Boston Soc. Natural History.

CARMENTA FRAXINI. n. sp.

Wholly bronze black. Fore wings with a very small vitreous dash near base, and a bright orange discal dot at extremity of cell. Costal margin greenish black, a purplish tint on the posterior margin. Hind wings vitreous, rather narrowly margined, with a bunch of whitish hairs at their base. Under side of wings a little more golden than the upper. Antennæ, palpi, femora, tibiæ and tarsi, brownish black. Abdomen with no trace of band, except on posterior margin of fourth segment beneath, which is pale yellow. Caudal tuft small, brownish beneath, black above.

Exp. wings. 16 m.m.

1 ♂. Washington, D. C. (C. V. Riley.)

ALBUNA. nov. gen.

Under this name I separate a number of species, which seem to me to possess characters sufficient to form the types of a new genus. Compared with *Ægeria* proper, and taking *Æg. Acerni* as the North American type of that genus, the head is much narrower than the front of the thorax, which is not so far produced beyond the base of the wings. The antennæ are comparatively shorter, stouter and more thickened toward the apex. The palpi are slightly longer and more porrect. The legs are shorter proportionately and the tibiæ more densely clothed with hair. The abdomen of the ♂ is never constricted at the base, is stout, cylindrical, with the caudal tuft small, and not spreading. That of the ♀ is fusiform, quite as broad at base as the thorax, and tapering to a point. The markings of the wings are heavier and broader than in *Ægeria*, the discal mark being always oblique, and the space between the sub-median nervule and the internal marginal nervule always covered with scales. For the group, these are rather large insects, allied to *Bembecia*, but the antennæ are not so deeply pectinated, the body is more fusiform, and the caudal tuft is not spreading.

Type. *Æg. hylotomiformis.* (Walk.)

ALBUNA RESPLENDENS. n. sp.

♂. Fore wings with the whole surface very bright orange red, the costal margin a little shading into golden brown, and the corner of the nervules indicated by golden brown streaks. Hind wings with the margin narrowly orange red. Fringes of both wings golden brown. Beneath, the markings are repeated, but the costal edge of the fore wings is lemon yellow. Head and antennæ black, the former with some blue metallic scales between the eyes. Thorax with broad lateral and narrow basal stripe, golden yellow. Abdomen with first, second and third segments broadly banded posteriorly with golden yellow, fifth, sixth and seventh wholly golden yellow, as is also the caudal tuft. Under side of abdomen, palpi, coxæ and all the legs golden yellow, the tibiæ banded at the joints with black. ♀. Similar to the ♂, but a little more robust, the posterior segments of abdomen banded with, but not wholly, golden yellow.

Exp. wings. 23 m.m.

1 ♂. Soda Springs, Siskiyou county, Cal. (I. Behrens.) 2 ♀. Sierra Nevada, Cal. (S. Brannan.)

Type. Coll. Hy. Edwards.

ALBUNA RUTILANS. n. sp.

Fore wings with the costal margin broadly purplish brown, the internal and posterior margins deep golden yellow, not by many degrees of so red a shade as in the preceding species. The nervules are marked by brownish streaks. Hind wings with costal margin lemon yellow, the outer margin deep golden yel-

low, edged anteriorly by a narrow brown band. The fringes of both wings are golden brown. Underside of wings pale golden yellow, the rest of the markings repeated. Head and antennæ dull black. Thorax with the usual narrow lateral and basal yellow lines. Abdomen with all the segments banded with pale golden yellow, the third and fifth being the widest. Caudal tuft golden yellow, black in centre and at the sides. Palpi and all the legs golden yellow, the tibiæ banded at the joints.

Exp. wings. 20 m.m.

1 ♀. Virginia City, Nevada. (H. E.)

Type. Coll. Hy. Edwards.

ALBUNA RILEYANA. n. sp.

In this, which very closely resembles some of the Pacific Coast forms, the fore wings are wholly golden brown, except the discal mark and the basal half of internal margin, which are reddish orange, and the base, which is jet black. The hind wings have the transverse mark and the base of abdominal margin reddish orange. Fringes of both wings golden brown, except that of the abdominal margin, which is yellow. Beneath, the markings are strongly repeated. Head black. Antennæ brown, paler at the base. Thorax with narrow lateral and broad basal, yellow streaks. Abdomen with all the segments, except the first, equally banded with pale golden yellow, the bands extending underneath. Caudal tuft brownish, speckled with yellow. Palpi, coxæ and all the legs golden yellow, the tibiæ banded with black at the joints.

Exp. wings. 24 m.m.

1 ♀. Cadet, Missouri. (Prof. C. V. Riley.)

ALBUNA ARTEMISIÆ. n. sp.

Fore wings greenish black, especially so along the costa. The internal margin, some streaks on the posterior margin and the posterior portion of discal mark, dull orange. Costal and abdominal margins of hind wings, pale lemon yellow. Fringes of both bluish black. Fore wings beneath have the costal and internal margins lemon yellow, hind portion of discal mark, dark orange, and posterior margin streaked with pale orange. Hind wings as on upper side. Head and antennæ black. Collar deep lemon yellow, as are also the sides of the thorax. Abdomen with the segments banded posteriorly with bright yellow. The first and second bands are very narrow ; the third is notched posteriorly ; the fourth without band. The remaining segments are very broadly banded. Caudal tuft, black above and beneath, with a few yellow hairs at the sides. Palpi yellow, brown at their tips. Fore coxæ, blackish, yellow at the sides. Middle and hind coxæ wholly black. Fore tibiæ brownish yellow, banded with black. Middle and hind tibiæ, bright yellow, bluish black above. Tarsi, all yellow.

Exp. wings. 18 m.m.

1 ♂. Sier. Nev. Calif. (H. E.) on flowers of *Artemisia vulgaris.* L.

ALBUNA MONTANA. n. sp.

♂. Forewings with the costal and posterior margins bronze black, with a few silvery scales at the base. The discal mark is broad, oblique, widest at the costal edge, as in all the genus. The internal margin is reddish orange for about ⅔ of its length, and the discal mark is also edged posteriorly with the same color. The lower wings have the base stained with dull orange, and most of the nervules are the same color. The fringes of both wings are brown. Beneath, the wings are pale dull orange for about their basal ⅔. Posterior margin and discal mark, dull brown. Head and antennæ black, the latter brownish beneath. Orbits of eyes, white. Collar, cream color. Thorax black, with the base and the tegulæ behind, cream color narrowly. Abdomen with 1st, 2nd, 4th, 5th, 6th segments, edged posteriorly with cream color, the bands extending to the lower side. Caudal tuft black, sprinkled with a few yellow hairs. Palpi, cream color. Fore coxæ lead color, white on the outer edge. Femora reddish brown. Tibiæ, pale yellow, banded with black at the joints.

♀. Generally a little larger than the ♂, with the red on the forewings more distinct, and the yellow of the abdominal band of a brighter tint.

Exp. wings. ♂. 25 m.m. ♀. 32 m.m.

21 Examples. ♂. ♀.

White Mountains, N. H. (Morrison. Grote.) Nevada, Colorado. (Morrison.) Anticosti Isld. (Couper.) Sier. Nevada, Cal. (H. E.)

Colls. Tepper, Graef, Neumoegen, W. Grey, Dr. Bailey, Hy. Edwards, etc., etc.

A very variable insect, and of wide distribution, passing probably by degrees into the following species.

ALBUNA TANACETI. n. sp.

Probably a variety of *A. montana.* It is smaller, and the reddish orange of the forewings is more distributed over the whole surface, both above and below.

Exp. wings.

Several examples ♂. ♀. Colorado, (H. K. Morrison.) Mt. Hood, Oregon, (Morrison.) Califor., Sier. Nev., Cal., Vancouver Isld. (H. E.)

Colls. Neumoegen, Graef, Tepper, Hy. Edwards.

It is possible that both this and the preceding species are forms of Walker's *Æg. hylotomiformis.*

ALBUNA VANCOUVERENSIS. n. sp.

Much blacker than *Al. montana.* A heavy reddish orange line between the sub-median nervule and the internal margin,

and the under side of wings are slightly marked with reddish orange. Legs almost entirely black. In fresh specimens the bands of posterior abdominal segments are composed of silvery blue scales.

Exp. wings. 22 m.m.

7 examples. ♂. ♀. Vancouver Isld. (H. E.) Colorado, (Morrison.)

Type. Coll. Hy. Edwards.

ALBUNA COLORADENSIS. n. sp.

In this form the reddish orange is entirely obliterated, and the insect bears a near resemblance to the following: (*A. torva.*) It differs from that species, however, by having the abdomen banded faintly with silvery blue scales, as in *A. Vancouverensis*, and by the presence of a few scales of the same color in the vitreous spaces of the fore wings. It is smaller also, and the under side of the wings has a golden reflection, not seen in either *Al. Vancouverensis* or *Al. torva.*

Exp. wings. 21 m.m.

1 ♀. Colorado. (H. K. Morrison.)

Type. Coll. Hy. Edwards.

ALBUNA TORVA. n. sp.

Entirely dull, brownish black, wholly unrelieved by any other color, with the exception of a very narrow whitish posterior margin to the three basal abdominal segments, which is scarcely visible without a lens.

The only species, so unicolorous, known to me.

Exp. wings. 22 m.m.

3 ♀. Glen. Mt. Washington, N. H. Vancouver Isld. (H. E.) Colorado, (Morrison.)

Types. Coll. Bost. Soc. Natl. Hist. Hy. Edwards.

ÆGERIA FLAVA. n. sp.

Size of *Æg. tipuliformis* L. Fore wings with a bright golden yellow cast, which pervades even the vitreous space. Costal margin, golden brown. Discal mark, golden brown in front, edged posteriorly with rich orange. Vitreous space continued nearly to the posterior margin marked only by the nervures. Costal margin of hind wings golden yellow, other margins golden brown. Antennæ bright dark orange, brownish at the base. Palpi, collar, and fore femora lemon yellow. Tibiæ and tarsi golden, brownish without, and slightly banded with black. Thorax with base and two very distinct stripes on sides, lemon yellow. Abdomen with all the segments distinctly banded with lemon yellow, that of the fourth segment being the broadest. Beneath the abdomen is deep lemon yellow. Caudal tuft yellow, black in the centre.

Exp. wings. 16 m.m.

1 ♀. Colon. Isth. Panama. (T. L. Mead.)

Type. Coll. Hy. Edwards.

ÆGERIA AURATA. n. sp.

Small, size of *Æg. ceriiformis* Led. Fore wings wholly vitreous at the base, with the exception of the margins, of which the costal is rather broad, brown, edged posteriorly with gold. Posterior margin, gold color, with the nervules marked with purple. Hind wings edged narrowly with gold on costal, golden brown on other margins. Under side of wings same as the upper. Palpi and legs wholly golden, the latter faintly banded with a darker shade. Antennæ, golden beneath, brown above. Thorax and abdomen brownish, the former with the sides golden yellow, the latter with all the segments banded with golden yellow, the two middle bands being the widest. Beneath the abdomen is wholly golden yellow, and the caudal tuft is the same color.

Exp. wings. 11 m.m.

1 ♂. Panama. (H. E.)

Type. Coll. Hy. Edwards.

ÆGERIA CORNI. n. sp.

Allied to *Æg. acerni.* Clem. Costal and posterior margins of fore wings, large discal spot, linear internal margin, and narrow margin of hind wings dull black. Palpi, collar and underside of caudal tuft, bright orange. Pectus and fore femora, pale yellow. Antennæ black, fuscous at the apical third. Tibiæ and tarsi, blackish without, yellow within. Spurs, pale orange. Thorax and abdomen purplish black, the former with a few lateral hairs, and the latter with a slight golden reflection. No bands.

Exp. wings. 15 m.m.

1 ♂. On *Cornus sericea* L. Purgatory Swamp, Mass. (Mrs. Hy. Edwards.)

Type. Coll. Hy. Edwards.

ÆGERIA SAXIFRAGÆ. n. sp.

Allied to *Æg. fulvipes*, Harris, but differing from it by having the abdomen wholly blue black, above and below, and the antennæ also wholly black. Both pairs of wings have some reddish orange scales at their base, and the under side of caudal tuft is also reddish orange.

Exp. wings. 15 m.m.

1 ♂. Colorado. (Morrison.)

Type. Coll. Hy. Edwards.

ÆGERIA VERECUNDA. n. sp.

At first sight like *Æg. lycopsiformis* Esp., but the fore wings are almost entirely opaque. The fore wings are blackish brown along costal margin. The course of the sub-median nervule, the discal mark, and the extreme posterior margin are also the same color. The rest of the wing, including the spaces usually vitreous, is sordid white. Hind wings have a brassy tinge, and are blackish at their base. Fringe, bronze black, edges, sordid white. Both wings, beneath sordid white, clouded with bronze black. An

tennæ, blackish brown above, ash color beneath. Head in front, sordid white, crown yellowish. Palpi, orbit of eyes, fore coxæ, collar, lateral and basal stripes of thorax, sordid white. Abdomen with second segment blotched with sordid white, the fourth and sixth with narrow band of same color posteriorly, that of the fourth extending to the underside. Caudal tuft wholly black. Tibiæ and tarsi bluish black, speckled with sordid white.

Exp. wings. 20 m.m.

1 ♂. 2 ♀. Colorado. (Morrison.)

Type. Coll. Hy. Edwards. F. Tepper.

A very aberrant species as regards its coloration.

ÆGERIA BRUNNEIPENNIS. n. sp.

Fore wings rich brown, black at extreme base, the interior margin for half its length, and the posterior half of discal mark, reddish orange. The hind wings have a reddish orange shade at the base of abdominal margin. Fringes of both wings golden brown. Beneath, the wings are yellowish at their base for about half their length. Costa of hind wings orange, the rest as on upper side. Antennæ and head dull black, front deep yellow. Thorax black, with round blotch at base of wings, tegulæ behind and base, golden yellow. Abdomen with the posterior margins of second and third segments narrowly, and fourth, fifth and sixth broadly edged with golden yellow. Palpi, fore coxæ, and hind tibiæ golden yellow, the latter banded at the joints with black. Fore and middle tibiæ rather darker in color.

Exp. wings. 23 m.m.

1 ♀. Georgia. (Morrison.)

Type. Coll. F. Tepper.

ÆGERIA RUBROFASCIA. n. sp.

Fore wings purplish black, the median nervule running posteriorly very close to the internal margin, the discal mark is, therefore, very long, both its edges being nearly straight. Beneath, the fore wings have some streaks of straw color along the costal edge and at the base. Fringes, above and below, purplish brown. Head, thorax and abdomen, purplish black, the latter having the fourth and fifth segments wholly reddish orange. Caudal tuft hastate, purplish black, with the tip whitish. Palpi, coxæ, femora and tibiæ, dull black, with metallic lustre. All the tarsi and spurs sordid white.

Exp. wings. 20 m.m.

1 ♂. Georgia. (Morrison.)

Type. Coll. E. L. Graef.

ÆGERIA BOLLI. n. sp.

Fore wings dense black on the margins, the spaces between the veins on the posterior margin, orange. The wings are wanting in the purple reflection common to many species. Fringes, broadly brownish black. Beneath the markings of the upper side

are repeated. Head blackish brown, collar a dull yellow. Antennæ blue black. Thorax narrowly yellow at sides and base. Abdomen with first, second, third, fourth and seventh segments narrowly edged with yellow posteriorly, the band not extending underneath. Caudal tuft, black above, narrowly orange at the sides, orange beneath, except the base, which is black. Palpi orange, the tip brown. Fore coxæ, deep yellow. Tibiæ without brownish yellow, within golden yellow. Tarsi and spurs golden yellow, the former banded with black.

Exp. wings. 21 m.m.

1 ♂. Texas. (J. Boll.)

Type. Coll. B. Neumoegen.

Dedicated to the memory of Jacob Boll, an earnest and accomplished entomologist.

ÆGERIA LUPINI. n. sp.

Forewings purplish black, with bright golden reflection, the golden color being spread over the whole of the opaque space, which, with the costal and internal margins, are broad, leaving but small vitreous spaces. Costal margin of hind wings, lemon yellow, hind margins golden brown, with the extreme edge bright golden. Beneath, the forewings are wholly golden yellow, the discal marks, and the nervular streaks of posterior margins, purplish. Hind wings with the margins, broadly golden yellow. Head with the front, brown black, deep yellow at the base of antennæ. Collar deep yellow. Thorax with very narrow lateral line, and the scutellum, pale yellow,. Abdomen with the 3rd segment anteriorly, and the 5th posteriorly edged with pale yellow. The other segments without bands. Caudal tuft black above, orange at the sides, and pale yellow beneath, with the base black. Antennæ blue black. Palpi pale yellow, with black hairs beneath. Fore coxæ yellow without, blackish within. Middle and hind coxæ and tibiæ blackish, the latter with the outside pale yellow. Tarsi all yellow.

Exp. wings. 14 m.m.

2 ♂ 1 ♀. Marin & Mendocino Cos., Calif. (H. E. and O. Baron.)

Type Coll. Hy. Edwards.

ÆGERIA PERPLEXA. n. sp.

Very nearly allied to *Æg. tipuliformis* L., but smaller, with the discal mark more triangular, and the internal margin broader. The forewings are clouded with orange along the internal margin, and the fringes are golden brown. The antennæ are brownish for their basal third, black at the apex. Abdomen steel blue, with the edges of the third and fifth segment narrowly bordered posteriorly with pale yellow. Caudal tuft blackish above, orange at sides and beneath, except at base, where it is black. Under side of forewings golden yellow, with the discal mark purplish

black, as also are the courses of the nervules on the posterior margin. Palpi yellow above, with blackish hairs beneath. Fore coxæ blackish, with the exterior edge pale yellow. The fore and middle tibiæ are blackish above, pale yellow beneath. Hind tibiæ, yellow, banded with black. All the tarsi yellow, speckled with black.

Exp. wings. 13 m.m.

1 ♂. Texas. (J. Boll.)

Type. Coll. B. Neumoegen.

ÆGERIA IMPROPRIA. n. sp.

Forewings bronze black, with the internal margin rather broad, and enclosing an orange line. The intronervular marks of the posterior margin are also orange, as are the edges of the discal mark. Fringes of both wings, bronze black. Antennæ steel blue. Head and thorax brownish black, with the collar and narrow lateral stripes, pale yellow. Abdomen with second and fourth segments edged posteriorly with pale yellow. Caudal tuft, black above, orange at the sides, black beneath, except the tip, which is orange. Palpi yellow above, black beneath, tip also black. Legs as in *Æg. perplexa.*

Exp. wings. 15 m.m.

2 ♂ Marin Co. and Sier. Nev. Cal. (H. E.) 1 ♀. Washington Ter. (Morrison,)

Types Coll. Hy. Edwards. B. Neumoegen.

ÆGERIA SEXFASCIATA. n. sp.

Forewings golden purple, darkest along the costa, the intronervular spaces being bright gold. Fringes of both wings, golden brown. Beneath, marked as on the upper side, but with the costal and internal margins bright yellow. Head brownish, front with silvery greenish scales. Antennæ black. Thorax with collar and rather broad lateral stripes, deep yellow. Abdomen with all the segments except the fifth narrowly bordered posteriorly with pale yellow. Caudal tuft, purplish black above, pale yellow beneath, sides pale yellow. Palpi and anterior coxæ pale yellow. Tibiæ, pale yellow, banded with purplish black.

Exp. wings. 20 m.m.

2 ♂ Texas. (J. Boll. Belfrage.)

Types Coll. Hy. Edwards, B. Neumoegen.

ÆGERIA CORUSCA. n. sp.

Allied to *Æg. sexfasciata*, but smaller and much brighter in color. The forewings are purplish along the costa, coppery along the course of the nervules, bright golden in the intronervular spaces, and along the internal margin. The discal mark is also bright golden. Abdominal margin of hind wings pale yellow, the rest golden brown. Fringes of both wings brown. Beneath, the yellow is pale, the markings being repeated in a less prominent degree. Head brownish, with shining blue metallic scales

between the eyes. Antennæ, purplish brown above, reddish beneath, especially at the base. Thorax purplish brown, with very narrow lateral and basal lines of pale yellow. Abdomen purplish brown, with a few scattered bluish scales, the first, second, third, fourth and sixth segments very narrowly banded with pale yellow, the bands not extending beneath the abdomen. Caudal tuft, purplish brown, a little yellow beneath. Palpi pale yellow, terminal article, brownish. All portions of the legs pale yellow beneath, purplish brown above, except at the joints, where they are pale yellow.

Exp. wings. 14 m.m.
1 ♂. Texas. (Belfrage.)
Type. Coll. Hy. Edwards.

ÆGERIA AUREOLA. n. sp.

Color and size of *Æg. uroceriformis*, to which species it is closely allied. Forewings purplish brown, along two-thirds of costal margin. Discal mark also purplish brown, as are also the courses of the nervules. The rest of the wing, bright golden orange. Margin of hind wing, purplish brown, with orange line at base of the fringe. Fringes of both wings golden brown. Under side, lemon yellow, except the discal mark and the ends of the nervules, which are purple brown. Head and antennæ black, the latter with basal joint, golden yellow. Thorax with lateral and basal lines golden yellow. Abdomen with second, fourth, and sixth segments broadly yellow behind. First has very narrow line, third without band, and fifth with scattered yellow scales. Caudal tuft golden yellow, black in centre. Palpi, fore coxæ, pectus, and legs golden yellow, the tibiæ banded at their joints with purplish black.

Exp. wings, 19 m.m.
1 ♀. Nevada. (Morrison.)
Type. Coll. E. L. Graef.

ÆGERIA CONSIMILIS. n. sp.

So closely allied to the European *Æg. cephiformis*, Ochs. as to be very difficult to distinguish them. The present species is blackish brown, the posterior margins of forewings, with golden reflection. The palpi are wholly golden yellow, except the terminal joint, which is black. The base of the wings beneath, the fore femora, the whole of the tibiæ and tarsi inwardly are pale golden yellow, as are also the abdomen beneath and the sides of caudal tuft below. Outwardly, the middle and hind tarsi are black, banded with golden yellow. The bands on abdomen are five in number, very narrow, pale yellow.

Exp. wings, 20 m.m.
1 ♂ Dorchester, Mass. (P. S. Sprague.)
Type. Coll. Boston Soc. Natl. History, No. 1345.
The chief difference between this species and *Æg. cephifor-*

mis is as follows: In the European species the palpi are black at the sides, the abdomen black beneath, with the rings plainly shown, and the tarsi are wholly yellow, ringed with black, and not as in the present form, yellow only inwardly.

The ♀ of Æg. consimilis is unknown to me.

ÆGERIA HYPERICI. n. sp.

The nearest European ally to this species is *Æg. ichneumoniformis*, S. V. The margins of the wings are all very narrow. Costa and base of forewings, bronze brown. Internal margin, and discal mark, reddish orange. Posterior margin, and margin of hind wings, golden brown, with the fringes a little paler. Wings beneath, same as on the upper side. Head, antennæ, exterior of palpi, thorax and abdomen black, all the segments of the latter, above and below, narrowly bordered with lemon yellow. Interior of palpi, fore femora, and the whole of the tibiæ and tarsi golden yellow. The middle and hind femora are black, and there are small spots of black on the tibiæ, at the junction of the spurs. Caudal tuft, alternately black and yellow.

Exp. wings, 24 m.m.

2 ♀. West Virginia. T. L. Mead.

Types. Coll. Hy. Edwards.

ÆGERIA EUPATORII. n. sp.

Head and antennæ blackish brown, the latter obscurely banded near the apex with sordid white. Thorax and abdomen purplish brown, the former with a narrow line on the sides, and the scutellum dull golden yellow. The segments of the abdomen are narrowly bordered posteriorly with the same color, the bands of the third and fifth being the least conspicuous. Caudal tuft dull orange. Palpi whitish beneath, dull yellow above, with the terminal article light brown. Anterior coxæ and tibiæ dull yellow. Middle and posterior coxæ and tibiæ, pale lead color with golden tint. All the tarsi dull yellow, the posterior pair banded with purplish brown near the joints. Fore wings golden brown, with reddish orange scales, the opaque spaces varying in their width. Fringes of both wings golden brown. Underside of fore wings golden yellow along costal and interior margins, purplish brown at posterior margins, marked with golden streaks.

Exp. wings, 23 m.m.

2 ♀. Long Island, N.Y. In stems of *Eupatorium purpureum. L.* Mr. S. L. Elliot.

ÆGERIA INFIRMA, n. sp.

Very delicate in appearance, with the margin of forewings extremely narrow, straw yellow, the discal mark large, black, as is also the posterior marginal patch. The hind wings have the veins and margins remarkably fine. The color of thorax and abdomen is the same as in *Æg. eupatorii*, but the abdominal bands are narrower and fainter. The caudal tuft deep rich orange.

Otherwise as in *Æg. eupatorii*, of which species it may possibly be the ♂.

Exp. wings, 18 m.m.

1 ♂. Long Island, N. Y. (S. L. Elliot.)

Type. Coll. S. L. Elliot.

ÆGERIA IMITATA. n. sp.

Closely allied to *Æg. eupatorii*, but differing from it by having the antennæ very distinctly banded with clear white for the apical half, the basal half being steel blue. The thorax has the base *wholly* pale yellow, the bands of the abdomen are wider than in *Æg. eupatorii*, and the caudal tuft has the central portion brown, while the tibiæ are blackish, with purple reflection.

Exp. wings, 21 m.m.

1 ♂. Pennsylvania.

Type. Coll. B. Neumoegen.

ÆGERIA MORULA. n. sp.

Size and aspect of *Æg. stelidiformis*, Frr. Fore wings with the margins very broadly black, vitreous spaces sordid white. Fringes of both wings, brownish black. Under side of forewings sordid white, except discal mark, nervules, apex and posterior margin, which are black. Antennæ and legs wholly black, except the under side of tarsi and the spurs, which are sordid white. Palpi, narrow lateral stripes on thorax and three narrow bands on abdomen sordid white. Caudal tuft black above, sordid white beneath.

Exp. wings, 20 m.m.

1 ♂. Texas. (J. Boll.)

Type. Coll. B. Neumoegen.

ÆGERIA KOEBELEI. n. sp.

Purplish black, the posterior margins of fore wings with slight golden reflection. The base of internal margin and of the median nervule is very pale yellow. Margins of hind wings extremely delicate. Beneath, the fore wings are very pale yellow, deeper at the posterior margin, and there shaded with gold and purple. Head black on crown, with some pale golden metallic scales in front. Orbits of the eyes white. Antennæ black, with rufous stain near the apex, only visible above. Thorax has collar, front and sides clothed with scales of peculiar blue metallic lustre. Abdomen similarly clothed, with second and fourth segments narrowly banded with very pale yellow, the band of fourth segment reaching beneath the abdomen. Caudal tuft brassy black, yellow beneath, and with fine yellow hairs at the sides. Fore coxæ white, as is also the pectus, the latter bordered by pale blue metallic scales. Femora and tibiæ yellow beneath, marked with purple black at the joints above. Tarsi speckled with black at the joints above, yellow beneath.

Exp. wings, 13 m.m.

1 ♂. Tallahassee, Florida. (A. Koebele.)
Type. Coll. Hy. Edwards.

I have dedicated this pretty species to its captor, who is one of the most earnest and observant collectors in the United States.

ÆGERIA WASHINGTONIA. n. sp.

Deep black, the vitreous space behind discal mark being nearly circular. The fore wings have very slight golden tinge, produced by a few golden scales scattered along the posterior margin. Abdominal margin of hind wings slightly yellowish, the rest brownish black. Head and antennæ black, the latter rusty beneath. Thorax with short, narrow lateral line at base of wings, no basal line. Abdomen with second segment very narrowly, fourth broadly banded with yellowish white. Caudal tuft black, pale orange at the sides. Palpi deep yellow within, blackish without. Legs nearly all black, flecked with yellow scales, the tibiæ with the anterior portion banded with yellow.

Exp. wings, 19 m.m.
1 ♂. Washington Terr. (Morrison.)
Type. Coll. Hy. Edwards.

ÆGERIA DECIPIENS. n. sp.

Fore wings with the vitreous space beyond the cell unusually large, leaving only a very narrow posterior margin. The costal margin is brown, the discal mark orange, and the posterior margin golden, with the lines of the nervules blackish. Fringes of both wings golden brown. The under side is golden yellow, streaked by the nervules as above. Head and antennæ black, the latter dusky at the tip, and with a few yellow hairs at base. Thorax brassy black, with no lateral, but rather broad basal line divided in the centre. Abdomen brassy black, second segment very narrowly, fourth broadly and sixth narrowly edged with pale yellow. Between the bands are some pale blue metallic scales. Caudal tuft hastate, black, pale yellow at the sides. Palpi blackish above and without, yellow within. Tibiæ and tarsi golden yellow, banded with black.

Exp. wings, 15 m.m.
1 ♂. Colorado. (Morrison.)
Type. Coll. E. L. Graef.

ÆGERIA NEGLECTA. n. sp.

Fore wings nearly opaque, the usual vitreous spaces being thinly clothed with scales. The discal mark is, however, apparent, and is large and blackish. The ground color of the wings is golden brown,with bright gold scales scattered over the surface. Margins and fringes of both wings golden brown. Beneath, the wings are golden yellow, with purplish lustre, flecked with brown scales. Discal mark purplish. Fringes of both wings golden, with brown ciliæ mixed. Head and antennæ brownish black. Thorax with narrow lateral and basal pale yellow stripes. Ab-

domen with second and fourth segments narrowly banded posteriorly with very pale yellow. Caudal tuft brownish, the tip yellow beneath. Palpi, pectus, fore coxæ, base of tibiæ and tarsi pale dull yellow. Femora brownish black. Tibiæ broadly banded with black at the joints. Tarsi speckled with black.

Exp. wings, 15 m.m.

1 ♂. Olympia, Washington Ter. (H. E.)

Type. Coll. Hy. Edwards.

ÆGERIA IMPERFECTA. n. sp.

Fore wings golden purple, the golden shades being chiefly along the base of internal margin and the intronervular spaces. The usual vitreous space behind the discal mark is here almost obsolete, its position being covered with scales. Fringes golden brown. Beneath, the wings have a most brilliant opalescent tint, with the colors and markings of the upper side repeated. Head and antennæ dull black. Thorax with narrow basal, but no lateral lines. Abdomen with first, second, third and sixth segments very narrowly banded behind with pale yellow. The fourth segment has a wide band, reaching beneath the abdomen, which the others fail to do. Caudal tuft brassy black, yellow at the sides. Palpi blackish beneath, yellow at the tips. Coxæ and femora blackish. Tibiæ and tarsi yellow, the former banded at the joints.

Exp. wings, 13 m.m.

1 ♂. Colorado. (Morrison.)

Type. Coll. Hy. Edwards.

ÆGERIA HEMIZONIÆ n. sp.

Fore wings rich golden brown with purplish reflection. All the borders are broad, leaving in consequence a small transparent space. The veins of the posterior margin are distinctly black-Discal mark purple black, orange posteriorly, with golden reflec. tion. Hind wings with margins golden. Fringes of both wings golden brown. Head black, with several shining pale blue scales in front. Antennæ dull black. Thorax with the collar, tegulæ and base lemon yellow. Abdomen with all the segments banded posteriorly with deep lemon yellow, the bands on first and third being the narrowest. Caudal tuft deep lemon yellow, with the centre blackish. Beneath, the whole of the margins of the wings are bright deep golden, the discal mark of fore wings reddish orange. Palpi, fore coxæ and tibiæ lemon yellow, the latter banded with brown at the junction of the tarsi. The abdomen has all the segments beneath very narrowly banded posteriorly with pale yellow.

Exp. wings, 18 m.m.

2 ♂ 1 ♀. Nevada. On *Hemizonia luzulifolia*. D. C. (H. E.)

Type. Coll. Hy. Edwards.

ÆGERIA SENECIODES. n. sp.

Allied to the preceding species, but larger, with the internal

margin of forewings transparent below the submedian nervule, the transparent space reaching nearly to the base. The color of the wings is reddish orange, without any of the purplish tint of *Æg. hemizoniæ*, and the caudal tuft is much wider, with the centre lemon yellow, sides blackish, and wholly lemon yellow beneath, except the base, which is black. The abdomen beneath is very broadly banded with yellow. The fore wings beneath have the discal mark reddish orange and the posterior margins purplish brown.

Exp. wings, 22 m.m.

1 ♂. California. On *Senecio Douglassii*. D. C. (H. E.)

1 ♀. Nevada. (H. K. Morrison.)

Types. Coll. Hy. Edwards. F. Tepper.

ÆGERIA REFULGENS. n. sp.

Very bright golden brown. The fore wings very narrow, costal edge brown. Discal mark brown in front, reddish orange behind. Vitreous space small, linear. Fringes of both wings golden brown. Beneath the wings are brighter than above, the intronervular spaces being bright golden orange. Head and antennæ black. Thorax black, with very narrow golden yellow streak at sides, and a broader one at the base. Abdomen black, second, fourth and sixth segments banded behind with golden yellow. Caudal tuft black, golden yellow at the sides. Palpi, tibiæ, coxæ and tarsi golden yellow, the tibiæ black at the joints.

Exp. wings, 19 m.m.

1 ♂. Georgia. (Morrison.)

Type. Coll. F. Tepper.

ÆGERIA OPALESCENS. n. sp.

Steel blue, the fore wings with the opaque spaces greenish black, the vitreous spaces very opalescent, with a few silvery scales. Hind wings with bright opalescent reflection. Fringes of both wings purplish black. Beneath, the silvery scales of fore wings are much more numerous, extending over the whole vitreous surface. Head, palpi and antennæ deep jet black. Thorax concolorous with fore wings. Abdomen dark steel blue. The whole of the under surface greenish black, the tibiæ having at their base a tuft of whitish hairs. Spurs whitish, speckled with black.

Exp. wings, 28 m.m.

3 ♂. Virginia City, Nevada. (H. E.)

1 ♀. Colorado. (Morrison.)

Type. Coll. Hy. Edwards.

ÆGERIA NOVAROENSIS. *Behrens*. M. S.

♂. Head, palpi, collar, tegulæ, large spot on disk of thorax and one at base, rich orange red. Abdomen blue black, with six orange red bands above, and wholly orange red beneath. Caudal tuft wholly orange red. The tibiæ and tarsi are the same rich

color, ringed at the base with steel blue. Both wings opalescent, the anterior pair with the costal margin narrowly, and the posterior margin broadly, bluish black. Discal mark large, bluish black. Antennæ dull black.

♀. Similar to the ♂, but with the abdominal band rather narrower, and the hind tibiæ and tarsi dusky.

Exp. wings, 34 m.m.

1 ♂. Soda Springs, Siskiyou Co., Cal. J. Behrens.

1 ♀. Novaro, Mendocino Co., Cal. J. Behrens.

Types. Coll. Hy. Edwards.

ÆGERIA GILIÆ. n. sp.

Allied to the European *Æg. asiliformis*, Rott. The narrow costal border of fore wings, the moderate posterior margin, and the almost obsolete internal margin are golden brown, the discal point at termination of cell (discal mark) reddish golden. The narrow marginal border of hind wings, and fringes of both, golden brown. Under side of fore wings bright yellow at base, and along two-thirds of costal margin, where it gradually shades into golden brown. Discal mark reddish orange. Hind wings also bright yellow at base, and along half the costal edge, where the color shades into golden brown. Fringes of both wings as on the upper side. Antennæ blackish brown. Palpi and pectus lemon yellow. Tibæ yellow, black posteriorly. Hind tarsi flecked with dusky. Thorax bluish black on disk, with the sides narrowly lemon yellow. Abdomen with three distinct and rather broad bands of lemon yellow, which are widened greatly on the under side, making this nearly all yellow. Caudal tuft yellow, with a few black hairs intermixed.

Exp. wings, 24 m.m.

1 ♀. Colorado. (Morrison.)

Type. Coll. Hy. Edwards.

This species differs from *Æg. asiliformis*, Rott., in the browner color, and the discal mark being concolorous with the borders, while in *Æg. asiliformis*, the latter are black, and the discal mark fiery red, being thus thrown into strong contrast with the other portions of the wing. The abdominal bands, too, in *asiliformis* are distinct, both above and below, while in *giliæ* they are beneath almost joined into one yellow space, scarcely showing the division of the segments.

ÆGERIA MIMULI. n. sp.

Allied to the previous species. Fore wings with the extreme base black, and beyond this a longitudinal fiery reddish streak. Costal and internal margins golden brown. Posterior margins much paler, almost pure gold color. Discal mark, fiery reddish orange. Hind wings with the narrow margin golden brown. Fringes of both wings a little paler than the margins. Antennæ, black above and below, pale buff at the sides. Front, palpi, and pectus, cream white. Femora bluish black. Tibiæ whitish in their centre, steel

blue at both extremities. Tarsi a little deeper yellow, speckled with black. Thorax and head black, the former with the collar, sides and base very pale yellow. Abdomen with six very pale yellow bands, the second and fourth being half the width of the others. Caudal tuft composed of pale yellow and black hairs, equally mixed.

Exp. wings, 22 m.m.

1 ♂. Colorado. (Morrison.)

Type. Coll. Hy. Edwards.

At first sight this species appears to be very close to *Æg. giliæ*, but it has double the number of abdominal bands, and is a paler insect, with the fore wings decidedly narrower.

ÆGERIA MADARIÆ. n. sp.

Fore wings rich golden purple, with the golden shade most apparent at the posterior margin. Vitreous space very small, reduced to a mere line before, and a minute circular spot behind the discal mark, the latter space almost closed by the black nervules. Margin of hind wings golden brown. Beneath, the fore wings are golden, with purple brown costal streak, and the nervules are also purple brown. The margin of hind wings are paler than above. Palpi, fore and middle femora, and hind tarsi, pale golden yellow. Antennæ black. All the tibiæ marked with black at the junction of the spurs. Collar, sides of thorax, and posterior margins of first, fourth and seventh segment of abdomen, pale yellow. Abdomen purplish black on lower side. Caudal tuft, pale yellow on the sides, black in centre.

Exp. wings, 15 m.m.

3 ♂ 2 ♀. On *Madaria elegans* Don. Saucelito, Calif. (H. E.)

Types. Coll. Hy. Edwards.

ÆGERIA ALBICORNIS. n. sp.

Bronze black. Antennæ with the apical third clear white. The pectus and joints of the tibiæ are also white.

Exp. wings, 18 m.m.

1 ♂. Nevada. (Morrison.)

Type. Coll. F. Tepper.

ÆGERIA PROXIMA. n. sp.

Allied to the last. Bronze black, but with the palpi, edges of coxæ, and the middle of caudal tuft, clear white. Tips of tarsi clear white. Underside of fore wings pale yellow. Fringes golden brown.

Exp. wings, 20 mm..

White Mts. N. H. (Morrison.)

Type. Coll. F. Tepper.

ÆGERIA INUSITATA. n. sp.

Greenish brown throughout. Wings with all the margins very narrow, giving the insect a most delicate appearance. Orbits of the eyes, palpi beneath, collar, edges of fore coxæ, joints of

tibæ, and a narrow band on the fourth segment beneath, clear white. The lower side of abdomen has also a steel blue reflection.

Exp. wings, 24 m.m.

White Mts. N. H. (Morrison.) Andover, Mass. (F. G. Sanborn.)

Types. Coll. F. Tepper. Bost. Soc. Natural History.

ÆGERIA NICOTIANÆ. n. sp.

♂. Forewings bright golden purple, the latter color predominating along the costal margin. Vitreous space, almost linear, reaching nearly to the base of the wings, and closed posteriorly by the fiery red discal mark. Fringes of both wings, light golden brown. The under side of wings golden, the margin of the posterior pair the same color. Antennæ and head black, orbits of the eyes, clear white. Palpi golden yellow, darker above. All the legs pale golden yellow, the tibiæ banded with steel blue. Thorax with anterior and posterior margins golden yellow. Abdomen black, with narrow golden bands on second, fourth and seventh segments, the middle one being the broadest. Caudal tuft, black, golden yellow at the sides.

♀. Similar to the ♂, but a little larger, and the reddish discal mark more apparent.

Exp. wings, ♂ 11 m.m.; ♀ 14 m.m.

1 ♂. 1 ♀. Texas. (J. Boll.)

Types. Coll. B. Neumoegen.

PYRRHOTAENIA POLYGONI. n. sp.

All the wings opaque. Greenish black, with metallic reflection. Basal half of internal margin of forewings, the basal two-thirds of posterior pair, palpi, collar, sides of pectus, sides of thorax, fourth and seventh segments of abdomen, and the sides of abdominal segments bright fiery red. Caudal tuft red in the centre, greenish black at the sides and beneath. Fore femora fiery red, the rest greenish black. Tibiæ deep orange, black at the extremities. Tibial spurs, pale orange. Tarsi, greenish black.

Exp. wings, 18 m.m.

♂. San Miguel, Calif. (H. E.) On *Polygonum maritimum*. L.

Type. Coll. Hy. Edwards.

One of the most beautiful and striking species of the whole group.

PYRRHOTAENIA FRAGARIAE. n. sp.

♂. Forewings opaque. Costal half and posterior margin, pale golden green. Interior margin for about two-thirds of its distance, dark orange. Hind wings, vitreous in the centre, with the margins, and small discal spot, dark orange. Under side of wings, dark orange at base, golden brown on margin. Fringes, golden brown. Head, thorax and abdomen, greenish brown.

Palpi, collar, sides of thorax, sides of abdomen, broad band across sixth segment, and caudal tuft dark orange. Femora brown black. Tibiæ dark orange, black at their junction with the tarsi, which are orange, clouded with black.

♀. Similar to the ♂, but a little larger.

Exp. wings. ♂ 18 m.m. ♀ 21 m.m.

1 ♂ 1 ♀. Colorado. (Morrison.)

Types. Coll. Hy. Edwards.

PYRRHOTAENIA HELIANTHI. n. sp.

Differs from *P. fragariæ*, in having the forewings nearly wholly golden green, with the exception of a narrow stripe of dark orange, from base about half way along the internal margin. The vitreous space on lower wings is exceedingly small, the wing being almost covered with scales.

Exp. wings, 17 m.m.

1 ♂. 1 ♀. Virginia City, Nevada. (H. E.) On *Helianthus*, sp.

Types. Coll. Hy. Edwards.

Closely allied to the preceding, of which it may be an extreme variety.

PYRRHOTAENIA ACHILLAE. n. sp.

Golden green, with metallic reflection. Very narrow line on sides of thorax, and a narrow basal line along internal margin of forewings, orange red. Under side of palpi, sides of pectus, and under side of caudal tuft dull orange red. Fringes of both wings, head, and antennæ, dull black.

Exp. wings, 15 m.m.

1 ♂. San Rafael, Califor. (H. E.) On *Achillea millefolia. L.*

Type. Coll. Hy. Edwards.

PYRRHOTAENIA TEPPERI. n. sp.

Forewings bronzed black, a little purplish on posterior margin. Hind wings with costa pale orange. Fringes of both wings, purplish black. Beneath, both wings are orange at the base, with the vitreous space opalescent. Antennæ and front of head, dull black. Crown of head, whole of thorax, two basal segments of abdomen, under side of abdomen, caudal tuft, palpi, pectus, and coxæ bright deep orange. Tibiæ pale orange within, purplish black without. Tarsi purplish black, mottled with orange.

Exp. wings, 23 m.m.

1 ♂. Georgia, (Morrison.)

Type. Coll. F. Tepper. to whom I regardfully dedicate this exquisite species.

PYRRHOTAENIA EREMOCARPI. n. sp.

Steel blue. Base of forewings, narrow stripe on sides of thorax, palpi beneath, and sides of pectus, fiery red. Caudal tuft also fiery red, with the sides steel blue. Fringes, golden brown.

Exp. wings, 20 m.m.

1 ♂. Sier. Nevada, Calif. (T. L. Mead.)

Type. Coll. Hy. Edwards.

PYRRHOTAENIA MEADII. n. sp.

Greenish black, with metallic reflection. Base of forewings half way along internal margin, base of hind wings half way along abdominal margin, and the basal half of both wings beneath, fiery red. Palpi beneath, sides of pectus, fourth, sixth, seventh abdominal segments, middle and under side of caudal tuft, also bright fiery red. Femora and tarsi greenish black. Tibiæ dark orange, greenish black at both the extremities.

Exp. wings, 20 m.m.

3 ♂. Lake Tahoe, Califor. (T. L. Mead.)

Types. Coll. Hy. Edwards.

Two of these examples have a much more greenish hue than the other, and one of them has a small vitreous dash on the forewings. I do not, however, regard them as specifically distinct. I have dedicated the species to my friend, Mr. Mead, who has so frequently added rare species to my collection.

PYRRHOTAENIA ORTHOCARPI. n. sp.

Nearly allied to *P. Meadii*. The forewings, however, are rather pale sage-green, reddish orange at their base, and for half way along the internal margin. The linear space vitreous before the cell in *P. Meadii* is here filled in with shining silvery scales, as is also the small space behind the cell. Held opposite to the light, these spaces appear to be transparent, but viewed obliquely they are quite opaque. The hind wings have their base, and about one-half their abdominal margin stained with reddish orange, the rest of the margin, golden brown. Antennæ black, palpi dark orange, with the terminal joint, black. Fore femora dusky orange. Middle and hind femora, and fore tibiæ and tarsi dusky. Middle and hind tibiæ and tarsi orange, the former banded with black at the base of the spurs. Thorax and abdomen golden green, the former with the sides reddish orange. The abdomen has the fifth and anal segments broadly reddish orange above, the whole of the segments beneath being bordered posteriorly with the same color. Caudal tuft, reddish orange, greenish black at the sides.

Exp. wings, 20 m.m.

3 ♂. 1 ♀. On *Orthocarpus luteus*. Nutt. Washoe Lake, Nevada, (H. E.)

Types Coll. Hy. Edwards.

PYRRHOTAENIA TEXANA. n. sp.

Fore wings dark bronze-green, yellowish at base, along internal margin, and with a sub-linear vitreous space not reaching to the base of the wing. Discal mark black. Beyond this an orange patch, composed of three streaks, following the course of

nervules. Margins of hind wings, purplish black. Beneath, the marks of the upper side are repeated, except that the base of the forewings is a little more orange-yellow. Antennæ and head black. Palpi and collar bright orange. Fore femora and tibiæ black, edged with orange. Hind tibiæ, bright bluish black, orange at the joints. Hind tarsi, black above, orange below. Abdomen with second, fourth and seventh segments, bordered posteriorly with fiery red. Beneath, the three anal segments are banded with orange red. Caudal tuft, greenish black.

Exp. wings, 20 m.m.

2 ♀. Texas. (J. Boll.)

Type. Coll. B. Neumoegen.

ZENODOXUS HEUCHERÆ. n. sp.

♀. Wings all golden bronze, blackish at their base, and with some golden scales in centre of anterior pair. Beneath they are golden yellow. Palpi pale yellow, terminal joint black. Head and thorax golden brown, collar pale yellow. Abdomen with second, fourth, sixth and seventh segments very broadly pale yellow, the intermediate segments sparsely covered with yellow hairs. Under side of abdomen blackish. Caudal tuft brownish black. Femora blackish. Tibiæ and tarsi alternately ringed with black and pale yellow.

♂. Smaller than the ♀, with the abdominal rings a little narrower.

Exp. wings, ♂ 13 m.m. ♀ 18 m.m.

6 ♂ 2 ♀. H. E. On flowers of *Heuchera rubescens* Torr. Lake Tahoe, Calif.

ZENODOXUS POTENTILLÆ. n. sp.

In this form the wings are wholly bronze brown, darker than in the preceding species, with a fiery red reflection, and beneath the basal two-thirds of wing is wholly fiery red. Antennæ dark yellow. Tibiæ and tarsi are fiery red, banded with black. The bands on the abdomen are a little darker yellow, but in other respects it resembles the previous species.

Exp. wings, 18 m.m.

1 ♂. 2 ♀. Lake Tahoe, Cal. San Rafael, Cal. (H. E.) With *Z. heucheræ.*

Type. Coll. Hy. Edwards.

ZENODOXUS CANESCENS. n. sp.

The general color of this very curious species is heavy gray. The fore wings are quite opaque, ash grey, flecked with a few black scales. Hind wings vitreous in their central portion, narrowly opaque along costal and abdominal margins, ash grey. Under side of wings same as above, with a few black dashes in centre of primaries. Antennæ, palpi, thorax, abdomen and legs wholly ash grey, with a few black speckles irregularly placed.

Exp. wings, 21 m.m.

2 ♀. Colorado. (C. V. Riley.)

NORTH AMERICAN SPECIES OF ÆGERIDÆ DESCRIBED BY FRANCIS WALKER, F.L.S. EXTRACTED FROM CATAL. LEPID. HETEROCERA, B. MUSEUM. PT. 8.

"ÆGERIA PLECIÆFORMIS.

"*Male.* Black. Head with whitish hairs behind. Palpi pale yellow, somewhat shorter than those of S. Æstriforme. Antennæ bluish black, slightly pectinated. Thorax with a yellow stripe on each side. Hind borders of the abdominal segments yellow. Legs luteous; femora black; tibiæ with black stripes. Wings limpid. Fore wings purplish black along the costa and at the tips, and with the usual band of the same hue. Length of the body 5 lines, of the wings 10 lines.

"Nova Scotia. From Lieut. Redman's collection.

"ÆGERIA PYRAMIDALIS. *Barnston, M. S. S.*

"*Male.* Black. Head with yellow hairs about the eyes. Palpi yellow beneath; third joint elongate-conical, much less than half the length of the second. Antennæ rather stout, almost filiform, slightly pectinated, ferruginous beneath, very much longer than the thorax. Thorax with two yellow spots on each side, one at the base of the fore wing and one in front. Abdominal segments with yellow bands, which are broadest and most distinct beneath. Legs with whitish stripes. Wings limpid, with blackish cupreous ciliæ. Fore wings blackish cupreous along the costa and at the tips, and with a blackish cupreous band, which is slightly bordered with red; a red line along the hind border. Length of the body, 5½–6 lines; of the wings, 9–10 lines.

"St. Martin's Falls, Albany River, Hudson's Bay. Dr. Barnston."

"ÆGERIA ODYNERIPENNIS.

"*Female.* Dark brown, slightly cupreous. Head whitish about the eyes. Palpi yellow, obliquely ascending, not long. Antennæ bluish black, simple, subfiliform, rather stout, very little longer than the thorax. Thorax with three yellow spots on each side. Abdomen with a yellow band on the hind border of each segment. Legs yellow; femora striped with brown. Wings limpid, with cupreous ciliæ Fore wings cupreous along the costa and at the tips, and with the usual band of the same hue. Length of the body, 5½–6½ lines; of the wings, 11–13 lines.

"Nova Scotia. 4 examp. E. Doubleday and Lieut. Redman."

"ÆGERIA EMPHYTIFORMIS.

"*Male.* Purplish black. Head with white hairs in front. Palpi thickly clothed beneath with rather long brown and tawny hairs. Antennæ ferruginous. Thorax with a yellow band in front and with a yellow spot at the base of each fore wing, and one at the tip of the scutellum. Abdomen with a yellow band on each segment; apical tuft black, with a few yellow hairs.

Legs red, partly yellow; femora black; tibiæ with black stripes. Wings purplish cupreous. Fore wings yellow and partly red in the disk, which is interrupted by the usual band. Hind wings slightly streaked with red, limpid toward the base. Length of the body, 5 lines; of the wings, 10 lines. *Female.* Head yellow in front and along the hind border. Palpi yellow, clothed beneath with reddish hairs. Antennæ red, blackish toward the tips. Apical tuft of the abdomen luteous, with a few black hairs on each side. Tibiæ wholly red. Fore wings with red disks. Hind wings mostly red along the borders.

"In this species and in *Æ. Odyneripennis* the antennæ of the male are more deeply pectinated than in the European species of the group *Bembecia*.

"United States. E. Doubleday."

"ÆGERIA HYLOTOMIFORMIS.

"*Female.* Dark ferruginous. Head with yellowish white hairs behind and in front, and about the eyes. Palpi pale yellow. Antennæ blackish at the tips. Thorax with a pale yellow tuft at the base of each wing. Abdomen with a testaceous band on each segment. Legs brown; fore coxæ testaceous beneath; tibiæ with a testaceous band; spurs and tarsi testaceous. Wings limpid, with purplish cupreous ciliæ. Fore wings with the borders and the usual band of the same hue. Hind wings with a purplish cupreous streak across the tip of the discal areolet, which character distinguishes this species from *Æ. Odyneriformis.* Length of the body, 6 lines; of the wings, 12 lines.

"Nova Scotia. Lieut. Redman."

"ÆGERIA PYRALIDIFORMIS.

"*Female.* Cupreous brown. Head with yellow hairs about the eyes. Palpi yellow, slender. Antennæ slender, subclavate, very much longer than the thorax. Pectus with a yellow stripe on each side. Abdomen with a yellow band at the middle of its length. Hind tibiæ mostly yellow; hind tarsi whitish. Fore wings cupreous brown, with a yellowish basal streak on the under side. Hind wings limpid, with cupreous brown ciliæ. Length of the body, 4 lines; of the wings, 8 lines.

"United States. E. Doubleday."

"ÆGERIA SAPYGÆFORMIS. (Group Conopia.)

"*Male.* Bluish black. Head with red hairs behind. Palpi red, black above toward the base. Antennæ serrated and pubescent beneath, very much shorter than those of the European Conopiæ. Abdomen with a slight red band at the base; segments from the fifth to the eighth red; apical tuft blue. Anterior tibiæ tawny; hind tibiæ with red tips; tarsi mostly testaceous. Wings with cupreous ciliæ. Fore wings blue, purple toward the tips, with a red discal streak, behind which there is a limpid streak. Hind wings limpid. Length of the body, 4 lines; of the wings, 8 lines.

"This species differs much from the typical form of Conopia, and somewhat approaches Pyropteron.

"United States. E. Doubleday."

"ÆGERIA GELIFORMIS.

"*Male.* Black. Head white on each side in front. Palpi almost bare; third joint lanceolate, rather less than half the length of the second. Antennæ bluish black, simple, ferruginous beneath and slightly thicker toward the tips, about twice the length of the thorax. Abdomen red, black at the base; apical tuft bluish black, red toward the base. Fore wings bluish black. Hind wings limpid, with blackish tips and hind borders. Length of the body, 3 lines; of the wings, 6 lines.

"United States. E. Doubleday."

Note. The species here inserted from Walker's descriptions will appear in the monograph in their proper position.

PAPILIO.

Organ of the New York Entomological Club.

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ON CERTAIN HABITS OF HELICONIA CHARITONIA, LINN., A SPECIES OF BUTTERFLY FOUND IN FLORIDA.

By W. H. Edwards.

In part read before the Ent. Sub-Section of the Am. Assn., at Cinn., August 18, 1881.

In Wallace's Contributions to the Theory of Natural Selection, London, 1870, page 77, we read: "There is in South America an extensive family of these insects, the Heliconidæ, which are in many respects remarkable. They are so abundant and characteristic in all the woody portions of the American tropics, that in almost every locality they will be seen more frequently than other butterflies. They are exceedingly beautiful and varied in their colors, spots and patches of yellow, red, or pure white, upon a black, blue or brown ground being most general.

They frequent the forests chiefly, and all fly slowly and weakly. Yet, although they are all so conspicuous and could certainly be caught by insectivorous birds more easily than almost any other insect, their great abundance all over the wide region they inhabit shows that they are not persecuted.

It is to be especially remarked also that they possess no adaptive coloring to protect them during repose, for the under side of their wings presents the same, or at least, an equally conspicuous coloring as the upper side, and they may be observed after sunset suspended at the ends of twigs and leaves, where they have taken up their station for the night, fully exposed to the attacks of enemies, if they have any.

These beautiful insects possess, however, a strong, pungent, semi-aromatic or medicinal odor, which seems to pervade all the

juices of their system. When the entomologist squeezes the breast of one of them between his fingers to kill it, a yellow liquid exudes, which stains the skin, and the smell of which can only be got rid of by time and repeated washings. Here we have, probably, the cause of their immunity from attack, since there is a great deal of evidence to show that certain insects are so disgusting to birds that they will under no circumstances touch them."

Mr. Belt, in "Naturalist in Nicaragua," p. 316, relates, that when in Brazil he watched a pair of birds catching butterflies and dragon flies, which they brought to their nest to feed their young, and in no case did they catch one of the Heliconidæ, which were in great numbers about, and could have been caught with less trouble than any others. Also, that a tame monkey, who was extremely fond of insects, and would greedily munch up any beetle or butterfly given to him, never would eat a Heliconian. There was no doubt from his actions that they were distasteful to him.

H. *Charitonia* is common in parts of southern Florida, and I am in possession of facts as to its habits through a correspondent, Dr. Wm. Wittfeld, a physician, resident at Georgiana, Indian River.

The eggs are laid on the tenderest terminal leaves of passion-vine. The caterpillars are conspicuous in color, being in the middle stages greenish white, and in the last stage dead white, like porcelain. They are furnished with long black spines, on the vertices of head as well as on body.

The chrysalis is a singular and remarkably pretty object. From the top of the head case proceed two long foliaceous divergent processes, and on the dorsal side of abdomen are broad and thin processes tipped with sharp thorns. The color is brown in shades, with some yellowish, and with burnished gold spots.

The butterflies live in the forest and fly along the paths, but they come into the open in the heat of the morning and return towards night, finding roosting places on Spanish moss and on dead twigs or branches, especially such as have dry leaves still hanging. Here they collect up to the number of seventy or even more.

The caterpillars, after third moult, at which time they become quite conspicuous in color, conceal themselves during the day.

Nothing appears to have been published of the preparatory stages of *Charitonia*, although it is a common species in Mexico, Central America, and some of the West India Islands. I deem myself fortunate, therefore, in having secured drawings of every stage for a plate in the "Butterflies of N. A." I have received young caterpillars, at Coalburgh, sent through the mails by my friend, and have raised them to chrysalis and imago.

Dr. Wittfeld, some time ago, called my attention to a strange habit of these butterflies, as follows: "On May 28th, I observed

three *Charitonias* on a chrysalis of same species in the woods. They were firmly attached, and on trying to drive them off they would not go. I tried repeatedly, and finally used force. But after flying around a few times they took up their former position, heads down.

The next day the same thing occurred, only I noticed that one butterfly at a time would leave to feed; force was again used, with the same result as before. The following day, shortly after dawn, only a trifle of empty shell remained.

This observation prompted me to raise another chrysalis, which I suspended in a flowering shrub, which *Charitonia* frequented, June 27. Soon some butterflies came and touched the chrysalis, but its wriggling seemed to cause them to move off. Two days before the imago was due, they attached themselves again, two or three at a time, and would only yield to force, always returning. On the third day, at daybreak, only a trifling bit of the empty shell was left, and the butterflies were all gone." Dr. Wittfeld adds, "Did they come to protect the chrysalis or to assist the butterfly to come forth, or was there anything of sexual desire?"

I replied to this, asking how the butterflies attached themselves. Did they actually rest on the chrysalis, holding on by the legs? Also, was I to understand by bits of empty shells remaining that the imagos had come from the two chrysalids? I suggested, if this last was not what he meant, that, perhaps, the butterflies had discovered that the chrysalids were dead and decaying and came to seek the fluids as they come to carrion.

On this Dr. Wittfeld again writes: "In each case the butterfly emerged from the chrysalis. The chrysalis looked natural but was growing darker, and the day before the emerging, the coming live insect could, to some extent, be distinguished. There was nothing dead or decayed or partly eaten about it. All the legs of the guarding butterflies had firm hold of the chrysalis, and it required a little effort to remove them with the fingers. They sat firmly, not lightly upon it. To frighten them off did no good, it required force to remove them. After having been picked off they did not stay long away, but flying around a few times, (I having removed to some distance), returned to the chrysalis and attached themselves to it just as they had done before."

This is explicit. May there not be here a case of intelligent protection of the unborn butterfly by other individuals of its species? The butterflies themselves are protected, as we read, by their obnoxious smell and taste, or both, from birds, lizards and other animals, and the chrysalis might be just as obnoxious after it was seized. But its color or appearance would not be sufficiently well known for its protection, and at the time when it was least able to take care of itself. To be sure, the chrysalis may, in a measure, protect itself by wriggling about, and by the

squeaking noise which we read in books the chrysalids of the Heliconidæ make when alarmed, and which Dr. Wittfeld informs me he had noticed in the case of *Charitonia*. But when the pupa-case was softening, and the immature imago was in condition to receive injury by any rough attack, apparently the friendly neighbors gather about it and cover it unceasingly till the danger is past, and the butterfly emerges.

The foregoing recital led to some discussion by members of the sub-section, and it seemed to be rather the prevailing opinion that the immediate cause of the gathering of the butterflies about and on the chrysalis must be sexual. Much was said about the attraction of males of the Saturnidæ by the females, but this is excited by the females at large, not encased in pupa. It was doubted by some members if any odor could emanate from the imago of a moth in pupa, or of a butterfly in chrysalis, hermetically sealed up, as it were. Further observations were desirable.

After returning home from Cincinnati, I wrote Dr. Wittfeld, urging him to try again, and especially to ascertain whether the free butterflies and the imago in the chrysalis were always of opposite sexes or not, and whether females were attracted to a chrysalis in any case. I have his further report, as follows;

"With regard to the chrysalis found May 28, of which I wrote you, I add, that there was found by me on the ground, on the morning the butterfly emerged, a female with wings but partly expanded, yet paired with a perfect male. Also, when I discovered that the butterfly had come from the second chrysalis, that of June 27, I found a similarly undeveloped female on the ground near by, paired with a free male. I lifted both and placed them on a twig. The male flew off in course of two hours, but the female remained, though a cripple and unable to move.*

"After receiving your letter, for a long time I could obtain neither eggs nor caterpillars of *Charitonia*, but at last, near the end of September, I hung out a chrysalis. A heavy rain storm setting in, no butterflies were flying that evening, and next day, six A. M., I found the empty shell of the chrysalis and imago. On Oct 1, I suspended another chrysalis. Soon a number of of butterflies appeared, flying around and touching it. None however attached themselves to it as in previous observations. I caught one after another of these butterflies, as they came, and put them in a bag. About eleven o'clock, the imago came from the chrysalis, and as it clung to the empty shell, an occasional free butterfly would alight by it or fly about it. On examination this imago proved to be a male, and so did the captured butterflies.

At the same time another chrysalis was suspended, and began to change color, October 4, early in the afternoon. Soon

* As Dr. Wittfeld had not mentioned these facts in his first accounts, I conclude that he did not then understand the relation between these crippled females and the imagos in the chrysalids, as he afterward learned to.

male butterflies appeared, took hold of the chrysalis, as before, but were easily frightened away.

By six o'clock, same afternoon, the color had changed, and males came freely, attached themselves firmly, and would not let go, in fact, were utterly regardless of their safety. When picked off they would fly around and return at once. Two males remained all night. Before daybreak next morning, I was at my post, and there found the two males, opposite one another, head down, abdomen curved toward the abdominal end of the chrysalis, both apparently exercising a pressure. Lighted matches held near them would not drive them off, shaking the twig did not loosen their hold, only picking them off bodily separated them from the chrysalis. The latter was now almost black, and momentarily I expected the shell to burst. This happened, but the break was not at the usual place. Owing probably to the pressure or weight of the butterflies the shell burst at the abdominal end, and *instantly one of the males made connection with the female imago, while the head and thorax of the latter were still enclosed in the shell.* After about ten minutes, I determined to free the new insect, which was accomplished by a slight pressure on the shell, and I then removed the pair and suspended them to a leaf-stem. The wings of the female immediately began to expand, but they did not fully develop. Without my aid, the imago would not have been able to extricate itself from the shell, although copulation had been affected.

I suspended another chrysalis, well discolored, under same conditions, October 7, in the morning. Males flocked around the chrysalis, circled about a few times, approached closely and then flew off again, none having alighted or actually touched the chrysalis. This went on for an hour, when a male emerged. The butterflies were mostly caught and all proved to be males.

October 17, another chrysalis was suspended under same conditions as the last mentioned. Males appeared, etc. Behavior just as before; none touching. The imago proved to be a male.

It seems to me that the sexual odor is but faintly developed when first discoloration takes place, and hence the chrysalis draws the males but little, but as the color changes the odor developes rapidly, so that males flock to the chrysalis from different directions."

On November 1, Dr. Wittfeld again writes, "To-day I made another corroborative observation on Heliconia chrysalis. At eight A. M., 2 ♂ ♂ attached themselves to female chrysalis, and acted as before reported. Four more males had appeared by nine o'clock, took hold as best they could, and the six made quite a bunch. Soon after others came, but had to be content with flying in close proximity, as there was no more holding room. At ten o'clock, I freed the female from the crowd, and found the abdomen exposed, but head and thorax still in the shell. I observed

that the abdomen was torn so that the contents were somewhat protruding.* I carried her to the house, allowed her to suspend from a branch, and being now out of the shell, the wings soon grew, and in another hour or so, the wound was healed or dried, and the insect flew off.

Though I have seen many Agraulis *Vanillæ* copulating, I don't remember of ever having seen H. *Charitonia* do the same at large. This prompts me to propose the following question; does this species ever pair in the ordinary way, after both sexes are fully developed, or do the males hunt the females while still in chrysalis? My late observations have brought me into all sorts of places, chiefly where passion-vine runs over dense bushes. There I have made frequent captures and have found all taken to be males. I believe the males were in search of a chrysalis. The females are mostly flying where the leafy parts of the vine are, while the males are where the chrysalis would be likely to be found, some distance off or below."

Dr. Wittfeld's admirable observations settle this; that in H. *Charitonia* the males are able, by some means, to distinguish the presence of a female in chrysalis, from the time when discoloration of the shell commences, that the attraction becomes stronger as the imago nears its emergence, that the females show no such attraction toward a male in chrysalis, and that males do not attract males. Incidentally, the female chrysalids would seem to be thoroughly protected against birds and other animals, but the protection, apparently, is purchased at a dear rate, if the female insect is liable to bodily injury or to be left crippled in wing. The last question propounded by Dr. Wittfeld, no doubt, he will in time be able to answer.

As I have elsewhere stated (Can. Ent. xiii, p. 208) it is not unusual to find female butterflies so lately out of chrysalis that the wings are at least limp, coupled with perfectly developed males, but I have not myself observed a case where the connection took place the instant the female broke from its shell, or before the wings were expanded. Certainly I have never known of male butterflies watching the advent of a female one moment, much more, for hours and days, and do not remember ever to have read of such an occurrence.†

November 11, 1881, discovered two chrysalids of *Charitonia* on the same plant, about two inches apart, but as much as two feet from the nearest passion vine. No. 1 was not discolored, No. 2 was a little discolored. To each chrysalis two males were attached. They would let go when touched, those on No. 2 hesitating a little; however, they all would return at once. On both chrysalids I noticed that the bodies of the males were bent

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* I take it that copulation had been effected and that the torn appearance was caused by the forcible removal of the male. W. H. E.

† NOTE—After the foregoing pages were sent to the printer, I received from Dr. Wittfeld a statement of further observation, as follows:

up, that is, off from the chrysalis, and the pressure excited in former observations was not yet applied by the males. Apparently the males simply kept hold so as to be on hand when things developed.

Nov. 12, No. 1 is forsaken. To No. 2 four or five males cling, head down, bodies still bent up. They leave only to feed.

Nov. 13, No. 1 still forsaken, but in course of the day males flocked to it, their bodies still bent up. Were frightened away readily.

Nov. 14, No. 1 had all the attention of the males, while No. 2 remained forsaken, the bodies now touching the chrysalis, but almost midway of the abdomen of the pupa, not at the extremity.

Later. Two males had taken firm hold, as in previous observations, touching at the end of abdomen of pupa; would not let go, but had to be picked off.

Later. I found a pair in copulation on the ground. Now I examined No. 2 and found the imago nearly developed, but dead, and this explains why the chrysalis was forsaken.

During this observation I noticed that the males would alight on the chrysalis as they do on flowers, then wheel around quickly, head down, body up.

Nov. 14. My attention was attracted by a flock of six or eight *Charitonia* butterflies on the edge of woods, flying around an object which, on inspection, I found to be a chrysalis.

SOME REMARKS UPON THE CATOCALÆ, IN REPLY TO MR. A. R. GROTE.

By Geo. D. Hulst.

I notice in No. 9, Vol. I. of "Papilio," some strictures by Mr. A. R. Grote upon myself and an article written by me upon the Catocalæ of the U. S., and published by me in the Bulletin of the Brooklyn Ento. Soc., Nos. 1 and 2, Vol. III.

Following Mr. Grote in his remarks upon the article, I reply as follows:

It is substantially charged that in the article I was but the mouthpiece of Mr. Strecker; that he was the author or inspiration of the determinations made. I am able to prove by Mr. Strecker's letters to me at the time that he was not the suggester or inspirer of the article, nor the author of its ideas; and, moreover, that in one way or another he did not agree with me in my determination concerning the following Catocalæ: *Belfragiana, Alabamæ, praeclara, Atarah, abreviatella, Whitneyi, illecta, Bunkeri, Snowiana, perplexa, Meskei, vidua, Sappho, residua, Angusi and Mariana*—16 in all. He consequently did not so nearly agree with me as did Mr. Grote.

In giving my judgment upon the names in dispute between Messrs. Strecker and Grote, I decided upon the following evi-

dence. While these gentlemen are principals in interest in this matter, they are not principals in evidence. Priority in names is based upon priority of publication. I accepted against Mr. Strecker, Mr. Grote's admission that Part XI. of Mr. Strecker's work was distributed Nov. 10, 1874. Had there been any necessity I would have demanded evidence from the publisher Mr. Strecker employed. Mr. Grote's descriptions were published by the American Ento. Soc., of Philadelphia, through Mr. Chas. A. Blake, its curator. Mr. Strecker, hearing I was about to publish the catalogue, wrote me a long article founded on letters received by him at the time from Mr. Blake, showing from these letters that Mr. Grote's names were not published in any way before Nov. 10. I told him, by letter, I would not receive that as evidence, unless Mr. Blake gave it his personal endorsement, and thus, as the agent of the Society, gave its declaration as to the time of publication. The papers were taken to Mr. Blake, and he, on the back of Mr. Strecker's argument, wrote as follows: "After going over all the data and correspondence between Mr. Strecker and myself, and carefully comparing dates from my own postal cards and letters to him in regard to the time proofs were sent to him (Mr. Strecker), it appears that Mr. Grote could not have received his "author's proofs" of his paper bearing date September, 1874, till after November 10, 1874, as there was no final corrected proof issued on that date yet. The matter on the other side of this, I find after going over carefully with the data at hand, is perfectly correct, so that if you want to use the name of Strecker after the species of Catocalæ in dispute, do so.

CHAS. A. BLAKE."

After my article was published, Mr. Hy. Edwards found some letters written him by Mr. Strecker at the time, which showed that Mr. Strecker's descriptions were not as yet written early in October, 1874. Of the existence of the letters neither Mr. Grote nor myself knew at the date of my publication. But from them it becomes certain that Mr. Strecker ante-dated Part XI of his work; and the two gentlemen in Brooklyn who told me they saw his proof sheets in August, were mistaken. These gentlemen are persons whose word any one would have taken without dissent. I told Mr. Grote I would publish the fact of Mr. Strecker's ante-dating, but he demanded that with that I should say the species were his, which, of course, I could not. I offered to publish the fact in the *Bulletin* of the Brooklyn Ento. Soc.; but as the fact did not affect the priority, the editor refused to allow it as it might tend to create confusion. Mr. Grote undoubtedly had his names first in MSS. Mr. Strecker undoubtedly had his first published. The date—September, 1874—on Mr. Grote's paper is the time it was received by the American Ento. Soc., and perhaps went to the printer—but the printer was slow, and Mr. Strecker got ahead in the race. When Mr. Hy. Edwards, acting as the advocate of Mr. Grote, came with his let-

ters to a meeting of the Brooklyn Ento. Soc, (this was after my catalogue was printed) to show me how unfounded was Mr. Strecker's claim, I showed him my evidence, which astonished him. I asked him whether with the evidence I could have decided otherwise, and he answered, emphatically, "No." I am aware Mr. Edwards yet gives the names to Mr. Grote, but he does it on the basis that probably Mr. Grote's proof sheets were first run off, and anything printed, though uncorrected and undistributed, is publication. I do not look at publication in that light, and decide otherwise.

I do not prefer the name *Amestris* to the name *Anna*. Any one looking in Staudinger's Catalogue at the names of the Catocalæ of the European fauna, and over a catalogue of the names of our own species, will see that the names run almost universally in certain lines. "*Levettei*," though from the name of a gentleman of worth and ability, is not in either of those lines of names. And that name is the only one I referred to when I said Mr. Grote's names were not all Catocaline, as Mr. Grote knew when he wrote. Furthermore, *Amestris* was not named in honor of Swinburne's heroine, any more than Mr. Grote's *Anna* was named in honor of the prophetess of that name.

Concerning the position and specific worth of many so-called species, each student has a right to his own opinion. I followed in the catalogue the definitions laid down by me in the introduction, and in so doing followed Drs. Le Conte and Horn in the Coleoptera, Dr. Staudinger, in his catalogue of the European fauna, and Dr. Packard in his Geometrid Moths of N. A. And, while in some respects my opinion has changed, in the main I see no reason to doubt the substantial correctness of my catalogue.

Mr. Grote says, "it was a happy stroke and worthy of the disciple of Mr. Strecker to refer *semirelicta* as a var. of *unijuga* and remove *pura* to some distance as a distinct species." If Mr. Grote will refer to the catalogue he will see *semirelicta* is a var. of *Briseis*, not of *unijuga*. In the determination of *semirelicta* I had the advantage of both the literature and type of the species and am not in the minority in my judgment of its specific value. I put *Beaniana* where, from the "literature on the subject," I thought it ought to belong, and *pura* is next. If *Beaniana* is not in its proper place, *pura* certainly is, unless, as I think now, it ought to be put before *Briseis* rather than after.

Cælebs is a good species. Mr. Strecker was responsible for the catalogue determination as was stated in the catalogue, and it is the only thing for which he was responsible. It is true, however, he still says, that he was misled by dark specimens of *Badia* identified by Mr. Grote as *Cælebs*. Mr. Grote, if such gross lack of appreciation be allowed me, is not absolutely beyond such mistakes. He once upon a time identified many of the Heterocera for me, receiving therefor my written and substantial thanks. Among the insects sent were two Catacolæ. One a typical spec-

imen of *Aspasia*, the other the type of *pura*, a description of which was already written. I desired thus to get Mr. Grote's unprejudiced opinion, and learn whether the former was his *Arizonæ*, and the latter his *semirelicta*. Mr. Grote actually sent the former back labelled "*Walshii*," and the latter "*Faustina*." Is it possible he had never studied the literature upon the subject? Is it possible he did not know he had written a description of *Arizonæ*, to which he could refer? Is it possible that he did not know Mr. Strecker had written a description of *Faustina*, and had given a colored figure of it so excellent that the merest beginner could have known *pura* was not *Faustina*? Is it possible that he did not know he had the type of *semirelicta* in his cabinet, and was he ignorant of the "literature upon that subject" also? These facts throw some "light" upon Mr. Grote's claim that Mr. Strecker's *Aspasia* is his *Arizonæ* and that my *pura* is his *semirelicta*.

It is said I turned the sequence of the species upside down. I did, and gave as a reason for it that the yellow under winged species seem to follow more naturally after *Leucanitis* and *Parthenos*, and the dark under winged species glide more naturally into *Spintherops*. Can any one give a reason for the contrary arrangement except that Dr. Morris began it?

Mr. Grote's article and argument are largely made up of personalities. Upon these I have nothing to say. American lepidopterology has been disgraced in the eyes of the world, in the past, by such things. I will not be a willing party to the continuance of the disgrace. It is something for thought that my friend, Mr. Grote, has almost without exception had a part in all personal disputes, and has generally been plaintiff in those in which he has had part. It is certainly time the method was abated.

NOTE BY THE PUBLICATION COMMITTEE.

It is a subject of great regret to us that anything like personalities should have crept into the columns of "PAPILIO," but Mr. Grote's article having been printed during the absence of the editor from this city, it appeared to be only "fair play" to allow Mr. Hulst the opportunity of reply. As far as this journal is concerned, the matter will end here, and no further personal remarks will again be permitted in its pages.

A NEW VARIETY OF CATOCALA.

BY G. H. FRENCH, Carbondale, Ill.

CATOCALA ROBINSONI. *Grote.*
Var. *Curvata.* n. var.

In this form the ground color is a little brighter gray and the markings are a little more distinct than in the usual form. The distinctive features are a prominent black basal dash extending from the base of the primaries beyond the t. a. line, and a curved shade of the same from the costa at the place of the beginning of the median shade to the outer margin below the apex. I have several specimens of *Robinsoni* in which there is a faint trace of

the subapical curve, but only a trace, and no others with even a trace of the basal dash. Expanse 1.35 inches.

Described from one ♀ taken here.

NOTES ON "THE TORTRICIDÆ, TINEIDÆ AND PTEROPHORIDÆ OF SOUTH AFRICA, LORD WALSINGHAM, M.A., F.Z.S.," &C.

BY C. H. FERNALD.

The above is the title of an interesting paper by Lord Walsingham on some of the microlepidoptera of South Africa, published in the Transactions of the Entomological Society, 1881, Part II., with four uncolored plates.

I do not feel competent to review this valuable paper, since most of the species are entirely unknown to me, but I wish to express the opinion that his Lordship has done a most praiseworthy work in clearing up the synonymy of the various writers on the micros of South Africa.

Lord W. found a single female in this collection, which agreed with the description of *Eccopsis Wahlbergiana* Zell., the types of which are in the museum at Stockholm. The genus *Eccopsis* was established by Prof. Zeller in 1852, for the reception of this species. In 1859, Lederer, in his classification of the *Tortricidæ* of Europe put the well known European species *latifasciana* Haw., into the genus *Eccopsis*, and this had been followed by later German writers down to the year 1875, when Zeller published his work on the *Tortricidæ* of North America, in which he expresses a doubt whether *latifasciana* is congeneric with his *Wahlbergiana*. Clemens had previously (1860) established his genus *Exartema* for *nitidana* and several other species, but in 1865 he suppressed this genus and put the species at first placed in it, in the genus *Sericoris*. Zeller, in the paper above referred to, revived the genus *Exartema* of Clemens and restored the species formerly placed in it, with some which he described as new. Zeller's original description of the genus *Eccopsis*, while agreeing with *Exartema* in general, did not mention the remarkable appendage near the anal angle of the hind wing of the male, and he did not think it possible that he could have overlooked it when he was characterizing his genus *Eccopsis* if it had really been present. Lord Walsingham has taken the trouble to determine the fact that such an appendage exists, and publishes a sketch of the hind wing of *E. Wahlbergiana*, made by Mr. C. Aurivillius, assistant in the Entomological Department of the State Museum at Stockholm, where the types are preserved. This sketch shows the venation and the characteristic appendage at the anal angle of the hind wing. The form of the anal angle beyond the appendage is subject to some variation among the American species, but the sketch of *Wahlbergiana* agrees very closely with *Eccopsis Footiana*, and differs but little from *nitidana*, the type of Clemens' genus *Exartema*.

From the North American species now before me I am sure

we cannot regard a certain amount of variation in the form of the wing, of generic value. I believe then that we are justified in regarding Clemens' genus *Exartema* equivalent to *Eccopsis* of Zeller, and our species should be referred to the latter genus.

NOTES ON SOME NORTH AMERICAN LEPIDOPTERA.

By ARTHUR G. BUTLER, British Museum.

GEOMETRITES.

It appears to me that no group of moths has got into greater confusion than the *Geometrites*, and I strongly suspect that the principal cause must be sought for in in the want of definition in this part of the work undertaken by M. Guenée; whether that eminent Lepidopterist was in a hurry to get through his work, or whether the publisher worried him, I do not care to inquire, but he certainly failed to distinguish between reliable and variable characters; and, worse than that, he failed to separate the species before him into natural groups; by this I mean to say that having characterized a genus as possessing primaries with the outer margin angulated, M. Guenée was as likely as not to place in it half a dozen species not possessing that character; whereas, according to description, he ought to have placed them in a succeeding genus.

As this uncertainty in the outline of species primarily referred to a genus has led to different authors forming entirely dissimilar views in accordance with the named types in their collections, the evil has naturally increased tenfold since the publication of M. Guenée's work, and the consequence has been a great multiplication of synonyms.

The following Geometrites have been sent to us by Mr. H. Edwards:

ENNOMIDÆ.

EUTRAPELA FALCATA. *Packard.*

Two examples exhibiting different color variation from the Sierra Nevada. The genus is confounded with *Chœrodes*, *C. transferens* of Walker being the same as *E. clemataria*, a blunder due to the vague description,—"*les premières à apex aign et à bord terminal droit ou coudé en angle sur la 2*," a door being thus opened for the introduction by M. Guenée and all subsequent authors, of species utterly unlike in outline of wing.

OPISTHOGRAPTIS SULPHURARIA. *Packard.*

Two examples from California: it comes near to nothing in the museum series.

"ENDROPIA MADUSARIA. *Walker.*"

The species sent under this name seems to me to be the *E. effectaria* of Packard's Monograph; it certainly is not Walker's species (which seems to me to be the same as that figured by Packard), but comes nearer to *E. pectinaria*, *tigrinaria*, *astylusaria* and *propriaria* of Walker's list.

METROCAMPA PERLATA. *Guenée.*

From Vancouver Island and Colorado; it is also in the museum from New York; it is very close to the European *M. margaritata.* Is it really distinct?

TETRACIS AURANTICARIA. *Packard.*

An example from California; it is new to our collection.

TETRACIS PARALLELIA. *Packard.*

A specimen from Sierra Nevada; this is also new to us.

TETRACIS TRUXALIATA. *Guenée.*

Sierra Nevada, California; new to us.

TETRACIS ŒGROTATA. *Guenée.*

Under this name Mr. Edwards sends us two examples, one from Saucelito, California, of a pale, sandy reddish tint, with a feeble pink gloss and with distinct grey stripes connecting the black nervular spots; excepting that it is rather smaller and of a deeper color, it hardly differs from *Sabulodes dositheata,* Guen. which we have from Rio de Janeiro. The other specimen is from San Francisco, is of a paler, sandy yellowish tint, with the grey stripes much less defined. We received a still paler, although very similar form some years ago under the Ms. name of *Chærodes punctata,* Pack. I should say that it is undoubtedly conspecific with *Sabulodes colombiata,* Guen., two examples of which we have from Venezuela, and also with *Chærodes subclararia* and *C. atropesaria,* Walk.

AZELINA HUBNERARIA. *Guenée.*

Two examples from Havilah, and Sierra Nevada, California. They are larger and redder than our specimens and the line across secondaries is less defined; their general coloration is that of *A. nerisaria.* These California specimens exhibit more clearly than I have hitherto seen it, the peculiar pouch-like opening on each side of the abdomen at its base. What is the use of this contrivance?

IDÆIDÆ.*

"ACIDALIA" QUINQUELINEATA. *Packard.*

Two specimens from Nevada. The species belongs to the group *Idæa* of Treitschke. The numerous forms associated under the name of *Acidalia* will have to be distributed into smaller and less heterogeneous groups.

"ACIDALIA" CALIFORNIATA. *Packard.*

Two specimens, California.

To associate this little rounded-winged species with the preceding is most painful, and in the face of the closely related genera of the family *Ennomidæ* seems ridiculous in the extreme. It is probably congeneric with *A. rubricata* of Europe and might be placed with it under *Emmiltis* of Hübner, though its body is somewhat broader than that of the European species.

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* I suggest this name to supersede *Acidaliidæ* since the name *Acidalia* was first applied to a group of *Argynnides.*

FIDONIIDÆ.

LOZOGRAMMA TRIPUNCTARIA.

Thamnonoma Tripunctaria. Packard.

Sierra Nevada, California.

It is incomprehensible to me why Dr. Packard should have referred this species to *Thamnonoma* (*Halia* auct.); its close affinity to *Lozogramma petraria* of Europe and *L. defluaria* of Nova Scotia must, I should think, be admitted by all who compare the three species; whereas the typical form of *Thamnonoma* is more nearly that of *Macaria*. *L. extremaria* seems to come nearer to *Aspilates? ordinata:* an example (much worn) of *T. marcescaria*, also in this series, has more nearly the character of the genus.

PHASIANE IRRORATA. *Packard.*

Sierra Nevada, California.

Allied to "*Aspilates*" *arenosa* of Natal and *A.? irradiata* of Shanghai, which will certainly have to be placed in the same genus with it.

SELIDOSEMA JUTURNARIA. *Boisduval.*

Sierra Nevada, California: unlike any species known to me, perhaps nearer to *S. sordida* of Japan than to anything else in our collection.

SELIDOSEMA JUTURNARIA. VAR. CALIFORNARIA. *Packard.*

Sierra Nevada, California. It appears to me that this insect ought to be regarded as generically distinct from the preceding; its more compressed and therefore more slender antennæ, less deflexed palpi, narrower primaries, upon which the subcostal branches are crowded together, and distinctly narrower secondaries seem, apart from the general aspect, which is palpably different, to warrant their separation.

EUASPILATES SPINATARIA. *Packard.*

Colorado. The genus appears to me to be identical with *Conchylia*, Guenée (1857); but the latter falls before *Conchylium*, Cuvier (1817) and *Conchylis*, Sodoffsky (1837).

LARENTIIDÆ.

RHEUMAPTERA BRUNNEICILLATA. *Packard.*

South California. We have nothing near to this species.

"GLAUCOPTERYX CÆSIATA. *Hübner.*"

Two specimens, Havilah, California. This is not the European *G. cæsiata*, the latter has the outer edge of the broad belt across the primaries regular and dentated, whereas this species is more llke *G. Kollariaria* with a regular sinuated band. I doubt the occurrence of G. *cæsiata* in America, although Packard's figure looks rather like the species: it is probable that the insect now before me is undescribed.

EPIRRITA 12-lineata. *Packard.*

S. Mateo Co.. California. It is apparently congeneric with my *Emmelesia phasma* from Japan, an insect bearing considerable resemblance to *E. albulata* of Europe: the latter, notwithstanding its similarity in size, general form and coloration, differs not a

little in neuration, the discoidal cell of the secondaries being altogether smaller and the bifurcation of the sub-costal vein much shorter.

EUPITHECIA CRETACEATA. *Packard.*

Summit of the Sierra Nevada. From its great size this species might readily be mistaken for a *Lobophora*, but its structure agrees better with *Eupithecia*.

PLEMYRIA FLUVIATA. *Hubner.*

Two examples. California. New to the collection.

OCHYRIA RUBRO-SUFFUSATA. *Packard.*

Two examples. Havilah, California. This type of coloration is new to me as associated with *Coremia* (to which genus *Ochyria* seems closely allied) it is rather characteristic of *Fidonia;* but in *Ochyria* one looks in vain for the broad plumose antennæ of that genus.

TRIPHOSA PROGRESSATA? *Walk.*

Triphosa dubitata, Packard (non Linn.)

Mendocino, California.

The insect sent by Mr. Edwards agrees in size and general pattern with Packard's figure, but not at all with European specimens of *T. dubitata;* the latter have grey secondaries, with the markings very faintly indicated. The primaries are altogether of a duller color, with the central belt much broader. I doubt the occurrence of *T. dubitata* in America. The example before me is, I believe, a slight variety of Walker's *Scotosia progressata*, from St. Domingo.

PETROPHORA PRUNATA. var. nubilata. *Packard.*

Oregon and Knight's Valley, California. It is allied to "*Cidaria*" *suffumata* of Europe and *C. Pryeri* of Japan.

EUBOLIIDÆ.

CHESIAS OCCIDENTALIATA. *Packard.*

One example Marin Co., California. Quite new to me.

This concludes the series presented to us by Mr. Edwards.

JOSEPH DUNCAN PUTNAM.

An earnest student, a devoted lover of science, and a kind and amiable man, has just passed away from earth. Joseph Duncan Putnam died on Dec. 10th, at his home, Davenport, Iowa, and in the city which he honored with the labor of his life, there will scarcely be found one to fill the place he occupied. Though suffering for many years past from that dread disease, consumption, and given over as incurable by many physicians, the marvellous strength of will which he possessed, enabled him to make a powerful struggle against the destroyer, and the work he has accomplished even under the pressure of sickness, has been such as few strong and healthy men could have given to the world. He was born at Jacksonville, Ill., in 1855, and was therefore, only 26 years of age at his untimely death.

"At the age of 10 or 11 years he began collecting fossils, minerals, plants, shells and insects, but gradually narrowed down the scope of his intellect, if the statement may be permitted, to the department of entomology. In 1872 he accompanied Dr. C. C. Parry to Colorado, where, during three months spent high up in the mountains, large collections were made in various departments of Natural History. There they were visited by the two eminent botanists, Dr. John Torrey and Dr. Asa Gray. The winter following was spent in hard study. In 1873, again in company with Dr. Parry, he was attached to Capt. Jones' expedition to the Yellowstone, as meteorologist, and carried a barometer for more than 1000 miles on mule back through some of the roughest districts of the Wyoming and the National park. In his reports of this expedition Capt. Jones makes frequent and honorable mention of the deceased, and the important and valuable service which he rendered to the cause of science."

On the founding of the "Davenport Academy of Natural Sciences," in 1867, he was one of its earliest members and devoted himself, heart and soul to the benefit of the society. "On the 28th of April, 1871, he was elected Recording Secretary, a position which he retained until January, 1875, when ill health caused him to resign. He was appointed a member of the Publishing Committee in November, 1875, and Chairman of the same in January, 1877. In November, 1876, he was elected Corresponding Secretary. In the spring of that year he commenced the publication of the proceedings of the Academy, and at the time of his death, he had been for nearly a year President of the Academy, combining with the duties of that office those of Secretary and Editor of the Proceedings." He was essentially a hard worker, too much so, perhaps, for the frail body which enclosed his aspiring and inquiring soul, and in all that he undertook, "thoroughness and truth" was his motto. His papers on *Leucanium acericola, W. and R.* (the Maple barklouse) are valuable contributions to entomology; while his researches into the life-history and classification of the singular Arachnid family, *Solpugidæ*, if he had lived to publish them, would have made his name famous wherever science is known. It is not many months since, that he spent several days in the libraries of New York and Boston, in searching for literature upon this little known group of animals, and it is to be hoped that he has left behind him some MSS. upon this subject. which may yet see the light.

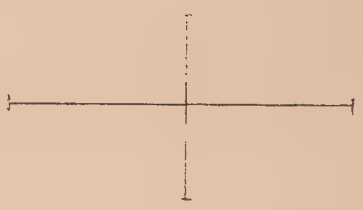
Mr. Putnam was early elected a Corresponding Member of the N. Y. Entom. Club, and manifested the warmest interest in its success, the state of his health and his constant occupation being the only obstacles to his frequent contributions to our columns. He died, as he had lived, full of hope, an earnest, brave, and gentle soul, animated by kindness for all, and leaving behind him none but those who admired his character, and who love and honor his memory.

HY. EDWARDS.

Pl. 1.

1a.

1.

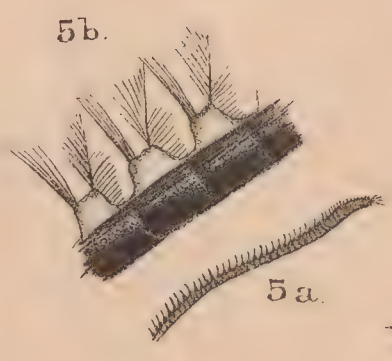


2a.

3a.

2.

3.



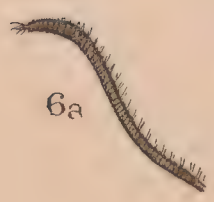
5b.

5a.

4a.

4.

5.



6a.

6b.

6.

7a.

7

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1. 1[a]. *Ægeria emphytiformis*..... Walk.
2. 2[a]. " *pleciæformis* .... "
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It has been found impossible to prepare the Index and Corrigenda for the present number, but they, together with the title page of Vol. 1, (which is complete with the present month,) will be forwarded with the first No. of Vol. 2., in January. Intending subscribers are requested to send in their names as early as possible. Several new features will appear in the 2d Volume.

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ERRATA ET CORRIGENDA.

Page 3, line 31, substitute "r" for "R" in 3rd word.
" 5, " 36, for "Catacola" read "Catocala."
" 6, " 40, after "proceeds" insert "one."
" 7, " 38, for "imagoes" read "imagos."
" 8, " 5, " " " "
" 8, " 15, " " " "
" 8, " 22, " " " "
" 10, " 31, for "Wissfield" read "Wittfeld."
" 13, " 8, substitute "n" for "N" in 3rd word.
" 14, " 2, for "imagoes" read "imagos."
" 15, " 35, for "ochery" read "ochrey."
" 16, " 4, " " " "
" 19, " 6, in "marking" add "s."
" 20, " 7, for "crimson" read "cinnamon."
" 24, " 15, for "concolorus" read "concolorous."
" 26, " 3, after "1" add "♂."
" 26, " 18, for "♂" substitute "♀."
" 29, " 20, for "latten" read "latter."
" 30, " 12, for "imagoes" read "imagos."
" 30, " 28, for "habital" read "habitat."
" 30, " 35, for "Pieni" read "Pieris."
" 30, " 35, for "Ilaiare" read "Ilaire."
" 35, " 27, add a comma after "Colias."
" 35, " 34, for "Scequoilus" read "Sequoiolus."
" 38, " 41, for "primiaries" read "primaries."
" 40, " 36, for "imagoes" read "imagos."
" 41, " 39, for "I. R. Pilate" read "G. R. Pilate."
" 43, " 5, for "Peridiceas" read "Perdiocas."
" 43, " 15, for "grayish" read "yellowish."
" 44, " 8, for "Perdiceas" read "Perdiccas."
" 51, " 17, for "Crensa" read "Creusa."
" 53. " 10, substitute "t" for "T."
" 58, " 7, add "and" between "Lilacina" and "Legitima."
" 59, " 11, for "as" read "a."
" 59, " 12, for "Hadeva" read "Hadena."
" 59, " 25, dele "semilunata."
" 70, " 2 of foot note, for "spot's" read "spots."
" 71, " 30, for "Iuvenals" read "Juvenalis."
" 72, " 4, dele "in the Middle and Eastern States."
" 72, " 22, after "met with" add "in the Middle and Eastern States.
" 73, " 4, for "Cæspitabis" read "cæspitatis."
" 73, " 4, dele foot note of the page.
" 81, " 19, for "L. pholu" read "L. pholus."
" 94, " 6, for "sometime" read "sometimes."
" 99, " 31, 1st column dele "Napææ," and place it in 2d column thus

EUROPEAN

SUMMER FORMS.

3 Napææ. (Europe.)

Page 100, line 28, for "♀" substitute "♂."
" 100, " 29, for "♂" substitute "♀."

Page 104, line 16, for "Amphelophaga" read "Ampelophaga."
" 104, " 23, for "represnt read "represent."
" 105, " 45, for "Cauthetia" read "Cautethia."
" 111, " 34, 1st col., for "Dimeter" read "Demeter."
" 112, " 41, 1st col., for "Lemoniid" read "Lemoniidæ."
" 112, " 43, 1st col., for "Libythæa" read "Libythea."
" 112, " 47, 1st col., for "Isopthalma" read "Isophthalma."
" 113, " 18, 1st col., for "Villersi" read "Villiersi."
" 113, " 35, 1st col., for "Marmorea" read "Marmorosa."
" 113, " 39, 1st col., for "Hoppfer" read "Hopffer."
" 113, " 41, 1st col., for "Achylodes" read "Achlyodes."
" 113, " 21' 2nd col., for "Mayo" read "Mago."
" 113, " 22, 2nd col., for " " "
" 113, " 24, 2nd col., for " " "
" 113, " 44, 2nd col., for " " "
" 113, " 40, 2nd col., for "Cuxana" read "Cunaxa,"
" 113, " 48, 2nd col., for "Syricthus" read "Syrictus."
" 113, " 58, 2nd col., after "Zephodes" dele "Cr." and put in "Hubn."
" 114, " 6, for "Achylodes" read "Achlyodes."
" 114, " 24, for "Pasco" read "Paseo."
" 114, " 34, for "Amnon" read "Ammon."
" 114, " 35, for "Astinida" read "Astenida."
" 114, " 36, for " " "
" 114, " 37, for "Sumadus" read "Sumadue."
" 114, " 39, for "Endamus" read "Eudamus."
" 114, " 43, for "Jaqua" read "Jagua."
" 114, " 44, for "Nisoniadus" read "Nisoniades."
" 115, " 18, for "Libocedrus" read "Libocedri."
" 129, " 42, reverse "p" in "Gnophæla."
" 132, " 17, for "Endamus" read "Eudamus."
" 141, " 16, for "thoacic" read "thoracic."
" 142, " 32, for "thich" read "thick."
" 155, " 44, for "ocher" read "ochre."
" 156, " 45, for "Stecker" read "Strecker."
" 157, " 19, for " " "
" 161, " 44, for "to far" read "too far."
" 163, " 22, for "Uniguga" read "Unijuga."
" 163, " 40, for " " "
" 169, " 15, for "coccoon" read "cocoon."
" 172, " 16, for "stigmota" read "stigmata."
" 172, " 30, for "other" read "others,"
" 175, " 35, for "ochery" read "ochrey."
" 176, " 45, for "Copidryus" read "Copidryas."
" 182, " 17, for "obselete" read "obsolete,"
" 185, " 31, for "8 m. m." read "16 m. m."
" 188, " 38, after "Exp. wings" add "24 m. m."
" 189, " 32, for "tipulifornis" read "tipuliformis."
" 201, " 20, for "margin" read "margins."
" 204, " 25, for "opposite" read "between the eye and the light."

NOTE.—Subscribers are requested to notice that the whole of the paper on Thecla Henrici, by W. H. Edwards, p. p. 150, 151, 152, has been reprinted, and forwarded with No. 11. The corrected copy should be inserted in the place of that in the body of the work.

EXPLANATION OF PLATES.

PLATE 1.

Edwardsia Brillians. NEUM.

PLATE 2 AND 3.

WINTER FORMS,

EUROPEAN.

1. *Bryoniæ* (Alps) ..... ♀
2. *Napi* (Germany) ..... ♂

AMERICAN.

4. *Bryoniæ* (Newfoundland) ..... ♀
5. *Hulda* (Alaska, &c.) ..... ♀
6. *Venosa* (California) ..... ♂
7. " " ..... ♀
8. *Oleracea hyemalis* (New York) .. ♂
9. *Borealis* (Anticosti) ..... ♂

SUMMER FORMS.

EUROPEAN.

3. *Napææ* ..... ♀

AMERICAN.

10. *Acadica* (Newfoundland .. .... ♂
11. " " ..... ♀
12. *Pallida* (Vancouver's Island) .. ♂
13. " " " .. ♀
14. *Castoria* (California) ..... ♂
15. *Oleracea æstiva* (New York) .. ♂
16. " " " ... ♂
17. *Virginiensis* (Coalburgh, W.Va. ♀
18. " " " . ♂

PLATE 4.

1. 1[a] *Ægeria emphytiformis* ..... Walk.
2. 2[a] " *pleciæformis* ..... "
3. 3[a] " *odyneripennis* ..... "
4. 4[a] " *hylotomiformis* ..... "
5. 5[a] 5[b] " *pyramidalis* ..... "
6. 6[a] 6[b] " *sapygæformis* ..... "
7. 7[a] " *geliformis* ..... "

PAPILIO:

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ON THE HABITS AND ECONOMY OF SOME SPECIES OF SPHINGIDÆ.

By Dr. Herman Behr, San Francisco.

The Sphinges are of those types that have attracted consider able attention even in the dawn of our science.

It is quite astonishing what a number of exotic Sphinges are figured in Cramer, Stoll and other ancient iconographs, and the very names given by the immortal Linné to the European species bear testimony how well their habits were known at the beginning of entomological study, because they refer either to the food plant of the larva, or to some peculiarity in its shape (*Porcellus*) and that is one of the strongest proofs of their having attracted the attention even of the non-scientists to a superstition the name of the fatal Goddess, *Atropos*, referring to the popular belief, that the appearance of this insect foreboded epidemics, famine or war. The name *Elpenor* is an allusion to the companion of Ulysses of that name, who met with a fatal accident when under the influence of wine. Linné evidently has chosen this name to indicate that the grapevine is the favorite food plant of the species. Nevertheless these powerful and active insects, whose peculiarities strike even the imagination of the common observer, do not play that part in the economy of nature that could be expected from their enormous locomotive powers, their spasmodic activity, and their formidable looking larvæ.

In fact, with very few exceptions their influence on other provinces of creation is limited, they rarely become injurious to vegetation and even then they are never an endemic pest, but only sweep a district like an epidemic not to reappear for more than a decennium.

The State of California as far as its fauna is known, is poor in Sphinges. Most of our species are too rare to play a part anywhere but in collections and cabinets of scientists.

Deilephila Lineata var. Daucus, is common throughout the State. It is also found in the Atlantic States and in the slightly aberrant form described by Linne, in Mediterranean Europe. It seems to be nowhere so common as on the Pacific slope. The larva prefers plants of the natural order *Onagraceæ*, viz: *Epilobium*, *Boisduvalia*, *Clarkiæ*, *Eucharidium*, *Godetia*, *Ænothera*, and since the introduction of the *Fuchsia* species into our gardens it has taken very kindly to the different varieties of these exotics.

The larva but rarely suffers here from *Ichneumon*, *Ophion* or other parasites. It has a strong vitality and the power to adapt itself to plants of different orders for instance *Rumex* and *Portulaca*. Occasionally, but rarely it is met with on the grapevine.

This species is known to have multiplied under favorable circumstances to an alarming extent. In a report published in the year 1877 I find a notice of such an instanee, of which I give the particulars.

In that year the neighborhood of Manhattan, in Kansas, was devastated by swarms of Locusts (*Caloptenus*) to a degree that all grass had entirely disappeared. Before the seeds of the destroyed grasses had a chance to germinate, their place was occupied by a herbaceous vegetation, chiefly consisting of *Portulaca oleracea*. Scarcely was this new vegetation started when numerous larvæ of *D. Lineata* made their appearance spreading even to some of the neighboring vineyards. This last circumstance roused the apprehensions of the people, when the cause of their fears disappeared as suddenly as it had made its appearance.

I read that *Philampelus Achæmon*, *Philampelus Satellitia*, and *Chærocampa Myron* are injurious to the grapevines of the Atlantic States. I do not know to what degree they are injurious, *i. e.* if they are dangerous, or merely troublesome and annoying.

Ph. Achæmon is the only one of these species as yet found in California. Like most insects, feeding on plants cultivated exclusively on large tracts of land, this species will multiply in favorable seasons to an alarming extent. Nevertheless, I do not know of any instance of material damage done by this species. The larva looks more formidable than it is in reality. It is of quick growth and soon transforms. The powerful flight of the imago carries the female to localities very distant from her birth place. Besides this, *Ph. Achæmon* partakes largely of the well known peculiarity of many Sphingides; namely, the undeveloped sexual character of the individuals that transform the same year and do not hybernate in the chrysalis state, so that the propagation depends mainly or the hybernating individuals.

From these circumstances it becomes evident that this species, although it may interfere to a certain extent with the production of a vineyard, is not capable of inflicting serious injury to the vines themselves, as is the case with endemic insect pests, or such epidemics as repeat more frequently.

I have no data as to what extent the injuries inflicted on vineyards by this species have been carried in the Atlantic States, nor am I in possession of exact statements in relation to *Ph. Satellitia* and *D. Myron.*

Macrosila Carolina and *M. quinque-maculata* occasionally injure tomato, potato or tobacco plantations. In California their destructions do not amount to much: in the Atlantic States, nevertheless, the damage done may be more serious. The insect seems to prefer tobacco to all other *Solanaceæ* and, therefore, in districts where a onesided agriculture excludes, to a considerable degree, cereals and fodder plants, the *Macrosila* species may develop up to insect pests. These pests probably will be of an epidemic, not an endemic character, as all Sphinges are rather unsteady in their quarters and of a nomadic turn. They generally crowd in one season and cannot be found in the next. Like *Ph. Achæmon* and its own near European relative, *M. convolvuli*, these species propagate only by the indviduals developed next summer, the numerous individuals developed the same season having their sexual organs imperfect and unfit for propagation.

I have read that *Ceratomia quadricornis* infests the elm trees of the Atlantic States sufficiently to disfigure avenues, but I did not find any statement that these shade trees suffered permanently. As far as I know the European *Sph. Pinastri* is the only insect of this tribe that, in certain seasons, inflicts permanent injury to vegetation, but the scourge of this species appears in the same district only after a lapse of years, never in two consecutive years, but when it occurs, the destruction sometimes is as if a forest fire had swept the region.

A forest infested by the larva of *Sph. Pinastri* exhibits even to the unexperienced eye striking peculiarities. Upon entering the invaded district a peculiar acrid, but not exactly disagreeable, smell is perceived; the ear is struck by a grating monotonous sound, caused by the feeding of innumerable larvæ; on the ground crawl gaily colored larvæ on a layer formed of fallen leaves, tops of branchlets and the cubic excrements of the caterpillar, some trying to hide under ground for transformation, others to regain a tree and climb up the trunk, from whose top some accident had thrown them. Large sized *Ichneumons*, and *Ophiones*, minute but shining *Chalcides* bury themselves around the larvæ, while lazy *Tachinæ* wait for an opportunity to drop a few eggs on those which are nervously seeking to hide for transformation. The larva and parasite are persecuted alike by *Carabus auratus* and *Calosoma Sycophanta*, whose metallic bodies

shine round the roots of the pines like golden coats of arms.

This entomological landscape is enlivened by villagers of all ages and sexes, under the command of some government forester, shaking trees, collecting caterpillars by broom and shovel into baskets and throwing them into fires kindled at different spots in the forest.

Modern forest culture has abandoned this system of warfare. Experience has shown that the *Pinastri* epidemic does not recur in the same district, even if nothing has been done. Science has demonstrated, that the enormous accumulation of parasitic *Hymenoptera* and *Diptera* would more than decimate the destructive insect without human aid. Besides this, insects, with enormous power of locomotion like *Sph. Pinastri*, never become endemic pests.

But the chief cause of a change in the forest tactics was the danger of fire, caused by the burning of the baskets amidst dry leaves, withered branches and dying pine trees.

Sphinx Pinastri is, as far as I know, the only *Sphinx* that occasionally causes serious damages, the harm done by the *Macrosilas* to cultivated *Solanaceæ* being scarcely worth mentioning.

If the Sphinges have but little power to harm vegetation, they nevertheless play an important part in their economy, for they are he carriers of pollen from flower to flower. Many of those flowers whose narrow tubular corolla contains anthers in a position that the pollen never could reach their own stigma nor that of a sister flower, are only fertilized by the interference of the *Sphinges*. The enormous length of the trunk of some of the *Macrosilas* is quite in proportion to the narrow, deep tube of the Tobacco flower and other *Solanaceæ* and *Apocynaceæ*, families not only patronized by the larvae, but also by the perfect *Sphinx*. And so it happens, that the precocious autumnal brood, whose imperfect sexual development prevents them from propagating their own species, contribute largely to the propagation of the plant that serves for food to the larvæ of their later born brethren and sisters. Looking for the nectar at the base of the cup they charge their trunks with the pollen and carrying in this way kisses from flower to flower, they are the means of fecundating the ovula, v. hose growth will serve as food for the offspring of their hybernating relatives.

There is a curious instance to be mentioned in regard to the mutual relation of some *Sphinges* and an *Asclepiadaceous* plant, the *Physianthus*. The pollen of all the *Asclepiadaceæ* being of a waxy, instead of a mealy substance, is not apt to be carried by the wind like the pollen of other plants nor is the position of the pollinea always such, that without interference of a third party, their contents can possibly reach the stigma. *Physianthus*, especially, is a genus, whose anthers are constructed on a plan that would impede communication between pollinia and

stigma, and therewith fecundation and propagation of the species, if it were not for the agency of insects, and especially *Sphinges*, which, attracted by the copious nectar in the deep grooves that surround the tubus stamineus, insert their trunks into these cavities, where the narrow entrance is guarded by the anthers. There is a rim between the lower parts of the loculi of the anther, large enough to admit the trunk of a *Sphinx*, but gradually closing towards the upper portion of the loculi. This rim will catch the insect by its trunk and will keep it prisoner till the loculi have discharged their pollinia and fecundation has taken place. It is easily understood, that where the point of maturity, when the pollinia are discharged, is distant, the poor *Sphinx* has to choose between remaining prisoner for life or losing its trunk.

We may plant the *Physianthus* near tobacco plantations. Not that I think it of much practical use in protecting the plantation; it is merely to get even with a good number of *Macrosilæ* that have injured other tobacco plantations when in the larva state.

As to the object that nature had in view in this arrangement, I am at a loss to offer any explanation, if it is not the opinion, that nature sometimes is fond of very practical jokes.

Small and transitory as the influence of the *Sphinges* may be on the household of organic life, their scenic effect is considerable. And it is not only their size, elegance of form and harmony of colors; it is also their extraordinary powers of locomotion. A single specimen may enliven a flower garden in such a way that it creates the impression that the whole region was swarming with the species. Suddenly the insect will dart away like a humming bird, leaving the garden quiet and lonely, but repeating the same nervous activity on flowers in a different latitude.

It is a well known fact that the larvæ of *Ph. Nerii* are found nearly every year in different countries of northern Europe, where its food plant, *Nerium Oleander*, is cultivated in glass houses. Now those larvæ are brought there by females that are fecundated in a country where *Oleander* grows in the open air. The most northern place, where the larvæ of *Nerii* has been found is St. Petersburg. It is more than possible that the female *Ph. Nerii*, that found her way into a Russian glass house, breakfasted on nectar of Oleander flowers on the borders of the Mediterranean.

And this is not an isolated occurrence. The very fact that the professional gardeners are wide awake to the financial advantages of having larvæ of this kind on their Oleanders, and that they do not kill them, but sell them, is the best proof of the frequently repeating occurrence. Some gardeners, induced by the prices paid by amateurs and collectors, have tried to cultivate *Ph. Nerii*, but all their efforts have been frustrated by the disinclina-

tion or disability of the specimens raised in northern climes to propagate. This is another proof of the frequency of such invasions, as each colony of larvæ is the product of an imigrated female, not of a female born in the northern region.

Modern investigations have also demonstrated that *Acherontia Atropos* and *Deilephila Celerio* do not propagate in Europe, and, consequently cannot be considered as indigenous species.

A French gentleman in San Francisco has shown me a little collection of insects, caught on board a vessel after a heavy gale, fifty-four geographic miles from the coast of Brazil. All these insects were *Sphinges*. They were ten in number; five *Macrosila Cingulata*, three *Philampelus Jussieuæ* and two specimens of a *Chærocampa*.

I could quote here a great many other instances that prove the wonderful powers of flight of these insects and their disposition to make use of them, but I consider the different facts mentioned here sufficient to demonstrate the impossibility to take measures against an invasion of such enemies. At the same time such measures, even if successful, would do very little good, because, in the few cases, where these insects inflict perceptible harm, the harm is but transitory, the enemy taking leave as abruptly as he appeared unexpectedly.

The advice to catch and kill the Sphinges hovering over flowers is as impracticable as to divert the course of a river by pailing. But if some people, not minding practical advantages, only wish to get even with the uninvited guests, let them plant *Physianthus*, and the torn off trunks sticking out of the flowers will satisfy the most revengeful disposition.

We would expect that the eminent power of flight in this group would produce a considerable number of cosmopolitan species, but there are comparatively but few. Two courses combine to restrict the majority to local distribution.

1. Their larvæ never are truly polyphagous. Most of them feed exclusively on a genus, many are even restricted to a single species whose geographical limits, of course, must comprise in that case the geographical limits of the *Sphinx*. The adaptability of their larvæ to the other kinds of food generally does not pass the limits of the botanical family, frequently, as mentioned above, does not extend even to species of the same genus. So *Deilephila Euphorbiæ* lives in quantities on *Euphorbia Esula*, rarely on *E. Cyparissias* and even in captivity it scarcely can be prevailed upon to feed on any other species and rather will die than touch most of the species of the Genus *Euphorbia*.

Its congener *D. Lineata* possesses of all the Sphinges known to me the greatest powers of adaptation. *Onagraceæ*, *Rubiaceæ Vitaceæ*, *Portulacaceæ* and *Polygonaccæ* will serve as food for its larva.

In consequence this species is to a considerable extent cos-

mopolitan. It is amphigeic, for it extends from California through America beyond the Atlantic into Mediterranean Europe and Asia, while *D. Euphorbiæ* is scarcely ever found beyond the limits of the most central part of Europe, but there in great numbers. In fact its habitat coincides with the habitat of *Euphorbia Esula*.

D. Galii adapts itself to plants of different families. It forms, therefore, part of the fauna of Europe, Asia and North America, and is, besides *D. Lineata*, the only instance of an amphigeic *Sphinx*.

D. Nicæa, *Dahlii*, *Hippophaes*, and *Vespertilio* are restricted in their food plants, consequently they are restricted in their habitat too.

Notwithstanding the roaming propensities of the individuals and their power to bear changes of temperature, the species themselves are strictly enclosed between certain isothermæ and isochimenæ, because the larvæ do not possess the same power of endurance in regard to climatic changes as the imago does. And this is perhaps the cause that all the immigrations of *Acherontia Atropos* before alluded to never succeeded in forming colonies.

Another peculiarity in the geograhical distribution of Sphinges may be derived from the same cause. The species of the Northern and of the Southern temperate zones are almost always distinct. Although these species invade the tropics from both sides, they never seem to be able to cross them so far as to reach the opposite temperate zone. The geographical distribution of some *Macrosila* and *Chaerocampa* is not a real exception, for their original home is the tropics, from whence they extend north and south. Perhaps some exception from this rule may be discovered in South Africa. The specimens of a so-called *M. Convolvuli*, which I have received from New Zealand, differ very materially from the European and North African insect and, are evidently the type of a new species.

As to the tropical species themselves, none of them are amphigeic. It may be, that in the course of time *M. quinquemaculata*, now beginning to form colonies on the Sandwich Islands, will reach the Australian continent, a feat that has been accomplished by one of our Diurnals (*Danais Archippus*).

The extratropical species of the Southern Hemisphere, at least so far as they are known, are distinct, each continent producing its own species.

NOTES UPON CATOCALA SNOWIANA

And Varieties in the Genus.

By A. R. Grote.

I have again carefully examined my type of this species. By the deep ochre yellow secondaries and the breadth of the mesial black band superiorly, I identify it as belonging to the Kansas form, hitherto regarded by me as a variety of our Eastern *Communis*, or of the Southern *Neogama* of Abbot and Smith. In the type, which is evidently an aberrant specimen, the fore wings are paler and appear somewhat aborted. This Kansas form, which must take the name *Snowiana*, differs by the forewings being diffusely shaded with black and wanting the brown subterminal space and greenish gray tint of the Eastern *Communis*. The mesial black band on the hind wings is broader above; the secondaries themselves are of an intense ochre yellow, darker than in the Southern *Neogama*. We then have three named forms which may be ultimately classed as varieties of *Neogama*. First the typical form from the South, of which a specimen collected by Belfrage in Texas, is in the collection before me. This has the hind wings and abdomen of a lighter yellow, the band as in the Northern form, the fore wings more gray than black, wanting the brown tints. Secondly the Northern and Eastern form, found from Canada to the Ohio River, described by Guenée as *Neogama*, but which, to distinguish it, I have called *Communis*. Thirdly the form above described from Kansas and which has perhaps a wider range. The question as to the value of these forms must be decided at a future date, when their complete history becomes known. It is, however, necessary, in order to discuss them intelligibly, that they bear different designations.

Since I first worked up the North American species of *Catocala*, a large number of species have been described and a great num- of varieties named. I briefly enumerate here the varieties named by myself so that there may be no doubt as to what I have intended by the names. I do so because this showy genus has, since 1872, been extensively written upon and there has been some misrepresentation with regard to the forms described by myself.

Var. *Simulatilis* of *Obscura*, has the median lines of the fore wings thick and distinct in both sexes, whereas, in the type, as figured, they are thread-like and partially illegible. Var. *Sinuosa* of *Coccinata* occurs in Florida; it differs from the typical form, described by myself, by the band on the hind wings being reduced to a sinuate, narrow, discal line or mark. Var. *Scintillans* is a well known and distinct form of *Innubens*, in which the fore wings are solidly brown to the subterminal line. Var.

Flavidalis of the same species has the hind wings yellow instead of orange. Var. *Bunkeri* of *Cerogama* has the median field of the primaries more or less suffused with brown, against which the white sub-reniform stands out in relief; the hind wings have the yellow band half narrower than in the type and the yellow base to the wing disappears. This variety is very beautiful in extreme examples and is named for Mr. Robt. Bunker of Rochester, who has devoted much attention to the species of this genus. Var. *Phalanga* of *Palæogama* is readily recognisable by the subterminal space being filled in with black contrasting with the white s. t. line; it is figured by me in the Proceedings of the Entomological Society of Philadelphia Vol. 3, Plate 3, fig. 1. Var. *Basalis* of *Habilis*, differs by the presence of a black basal streak on the primaries above. Var. *Westcottii* of *Anna*, differs by its smaller size and the black band of secondaries along the border being continuous and not interrupted as in the type before anal angle; the variety is from Illinois. Var. *Sordida* of *Gracilis*, differs from the type in having the primaries wholly of a dark hoary blue-gray; it has been collected by Dr. James S. Bailey in large numbers about Albany, N. Y., and is readily distinguished. Finally, var. *Lineella* of *Amica* differs by the darker shades on the forewings being gathered along the lines, giving the insect a distinct appearance, as compared with the type, while the ground color is powdered with greenish gray. This occurs with the typical form; in Texas another variety of *Amica* occurs in which the primaries are more or less suffused with black: Mr. Hy. Edwards calls this Var. *Nerissa*. Excluding *Communis* and *Snowiana*, as to the value of which I am doubtful, I have named ten varieties.

NEW SPECIES OF HETEROCERA.

By Henry Edwards.

FAM. SPHINGIDÆ.

PROSERPINUS CIRCÆ. n. sp.

In form and outline of the wing very closely resembling the California species, *P. Clarkiæ. Bdv.* but abundantly distinct in color. The primaries are of a reddish olive tint, the basal space, and that behind the median band being the palest. The band is rich, deep olive brown, almost straight on its anterior edge, sinuous on its posterior, leaving the costal termination twice the width of that of the internal margin, and enclosing a rather darker ovate discal spot, shaded posteriorly with paler color. Secondaries dull chestnut red, with the base and margins darker than the centre of the wing, the basal shade being in the form of a band. There is no trace of a black band, as in *P.*

Gauræ. S. and A. Fringes fawn color, and the extreme marginal edge of the wing, dark brown, particularly at the anal angle. Beneath, the wings are wholly dull reddish, (inclining to chestnut) at their base, with pale central band, and margins again slightly darker. Pale shades of apex of primaries repeated. Head and thorax olivaceous. Abdomen reddish with olive tint, darkest towards the posterior extremities. Palpi whitish, as are also the base of the legs. The lower side of the abdomen has the segments narrowly edged with whitish.

Exp. wings. 40 m. m. Length of body 25. m. m.

Georgia. H. K. Morrison.

Types. Coll. B. Neumoegen. H. Strecker.

This is the species figured by Mr. H. Strecker in *Lepid. Rhop. et Heteroc.* as *P. gauræ. Sm. Abt.*, but it is certainly not that species, as it has no black band upon the secondaries so observable in *P. gauræ*. In the original description, Smith says of *P. gauræ*: "Alis dentatis; primoribus olivaceis dualis albidis puncto disci deltoideo; posticis ferrugineis striga pallida extremis nigris, margine albo." Now both the black band and the white margin are absent in the present species, the general color is much redder, and the wings less dentated, shorter than in the figure of *P. gauræ*, and of a different shape. *P. gauræ* more closely resembles *P. Juanita* of Strecker, in fact, the latter is *P. gauræ*, with the secondaries orange instead of rusty red, as in Sm. Abb. figure.

CAUTETHIA GROTEI. n. sp.

General color of primaries, brown black, with a grayish tint. Basal space blackish, enclosed by a double, indistinct, black line. Discal mark, velvety black. Posterior double line also black, the inner one bent forward very suddenly towards the costa, from the subcostal nervure, the outer one nearly straight for its costal half, and sharply dentate on the nervures. The submarginal line has a grayish white shade behind it, continuing to the edge of the wing, and there is also a blotch of the same color near the centre of the internal margin. Fringes alternately black and gray. Secondaries rich bright orange for the basal two thirds. Marginal band brown, moderate in width. Underside brownish, flecked with white scales, the base of secondaries dull orange along the abdominal margin. Thorax and abdomen grayish with black scales, the fifth and seventh segments banded with darker shades as in Macroglossa. Antennæ dusky black.

Exp. wings. 33. m. m. Length of body, 18. m. m.

Indian River. Florida.

Several examples, all constant to the description. This species has been confounded with *Cautethia* (*Œnosanda*) *noctuiformis. Walk.* and has been distributed by Mr. Neumoegen and myself under that name. It was also so quoted by Mr. Grote in his Sphingidæ of Cuba, a specimen of the present

species being in the possession of Mr. Grote from that island. Mr. A. G. Butler, however, pointed out this error in PAPILIO, Vol. I. P. 105, and Mr. Grote, who has now seen Walker's type, thus writes from London under date of Dec. 3rd, 1881: "I have carefully examined the type of *Cautethia noctuiformis. Walker.* The specimen is unset, and smaller than ours from Florida; the forewings very similar, but the hind wings have the yellow only a patch at the base, and resting on the internal margin. The wider fuscous border extends also on costal region, and the yellow is paler." It cannot be but that we have here to deal with an entirely different species from that described by Walker, though it is somewhat extraordinary that so conspicious an insect as the present should so long have escaped the observation of our Florida collectors. The genus *Cautethia* has been placed by both Butler and Grote near *Anceryx* and *Dilophonota*. This appears to me to be an error, its coloration, shape of wing, extremely long longue, and tufted abdomen, bearing a closer resemblance to the *Macroglossinæ*. We know nothing, however, at present, of the early stages of this interesting group.

SPHINX (PROTOPARCE) CINGULATA. n. var. *decolora*.

A remarkable form, of which three examples are before me. In all of these, the rose-colored shade on the base of secondaries, and the sides of the abdomen, is entirely wanting. This is by no means owing to fading, or to the poor condition of the specimens, as two of them are absolutely fresh and perfect. In all other respects, the markings are identical with those of *S. Cingulata*. I can, therefore, only regard these examples as variations from the usual type. The species is of very wide distribution, having been found northward as far as Canada and southward as far as Brazil. It reaches also to the extreme west of the continent, and is very abundant in the Hawaian Islands. Have other observers noticed the extreme form now described?

Indian River. Florida.

Type. Coll. Hy. Edwards. B. Neumoegen.

DILOPHONOTA FESTA. n. sp.

Size of *D. obscura*. Head, smoky black on crown, mingled with grayish, with two white lines visible between the antennæ. Thorax blackish, mingled with gray—a double median line, and the tegulæ and space at base of the wings gray. Abdomen dull iron gray, with very faint blackish dorsal double line, enclosing a paler space. Sides and underside of both abdomen and thorax white, thickly interspersed with brown scales. Antennæ with the shaft white, the pectinations fawn color, and the tip pitchy-brown. Palpi, and the whole of the legs white, with brown scales. Primaries black, with a few gray scales intermixed, except on the apex and along the internal margin, where the gray predominates. The wings are deeply notched at the termination of the nervules, which are white and jet black, on a gray

ground. Secondaries dull red, with whitish streak at base. The costal margin is also whitish. Apex shaded with dull black, continued around the margin to near the anal angle, where the usual mark of the genus occurs. In this species, it is a waved broad line of black and gray alternately, the gray line being double, the upper strongly toothed. The nervures are black as they approach the margin. Fringes gray, except on the abdominal margin, where they are clear white. Underside of wings, dull brick red at their base, brownish towards the extremities, the margin speckled with black and white, and the whole surface mottled with brown scales.

Exp. wings. 66 m. m. Length of body. 38 m. m.

N. W. Texas. J. Boll. Type. Coll. B. Neumoegen.

Allied to *D. melancholica*, but the wings and abdomen are blacker, the marginal band of secondaries less distinct, and the anal spot more gray in color.

FAM. BOMBYCIDÆ.

LIMACODES RUDE. n. sp.

Fawn color, with black irrorations. A submarginal stripe of darker color, (pale brown) parallel with the posterior margin, and an oblique stripe of same color reaching from the middle of the costa to near the base of internal margin, the space enclosed by these lines being rather darker than the rest of the wing. Secondaries and underside, without markings, except the black irrorations. Thorax and abdomen rather darker than the wings.

Exp. wings. 28 m. m. Length of body. 11 m. m.

1 ♂ "Maryland."

Type. Coll. H. Schönborn, Washington.

LIMACODES TRIGONA. n. sp.

Wholly pale fawn color, except at the base of the primaries, where is a clear white, rather large, almost rectangular spot, the edges of which are shaded with pale chestnut brown. The apex of the angle is directed towards the costal edge of the wing. There is also a trace of a darker shade on the apical portion of the posterior margin. Underside entirely pale fawn drab.

Exp. winds. 30 m. m. Length of body 14. m. m.

1 ♂ Prescott, Arizona. I. Doll.

Type. Coll. B. Neumoegen.

ARTAXA INGENITA. n. sp.

Primaries deep yellow, inclining to orange, but not very bright in tint. Secondaries two shades deeper in color. Thorax, abdomen and legs concolorous. Under side of rather a paler shade. There are absolutely no special markings upon any part of either surface.

Exp. of wings. 35 m. m. Length of body. 8 m. m.

1 ♂. Prescott, Arizona. I. Doll.

Type. Coll. B. Neumoegen.

Though probably forming the type of a new genus, I am safe in referring this very singular insect closely to Walker's genus *Artaxa*, hitherto only known from India and Australia. Should further investigation, and a knowledge of the earlier stages prove my present course to be wrong, I think it wisest, anyway, to place a new insect provisionally in a very closely allied genus, rather than create a new one, which extended inquiry may prove to be one already established. I append Walker's diagnosis of *Artaxa*, merely remarking that in the present species the only differences I can see are that the antennæ are shorter than in Walker's genus, and the spurs of the hind tibiæ are short, rather than long. In color, general structure and neuration, the species now described reminds one forcibly of the Australian *Artaxa chrysophila*.

"Genus 7. ARTAXA.

"Male and female. Body rather slender. Proboscis very "short. Palpi hairy, short; second joint very much longer than "the first, third joint conical, very minute. Legs slender; hind "tibia with four long spurs. Wings broad. Forewings with the "first, second and third inferior veins near together, fourth about "four times further from the third than the third is from the "second. Hind wings extending beyond the abdomen. Male. "Antennæ deeply pectinated. Female. Antennæ minutely pectinated." F. Walker.

Cat. Lepidopt. Heteroc. B. Mus.. Pt. 4, Page 795.

EUCHETES INOPINATUS. n. sp.

Primaries very pale fawn color, palest along the internal and posterior margins. Costa with buff dash at the base, above and below. Secondaries paler than the forewings, being almost a sordid white. The whole wings beneath are dull sordid white, without marks, except the buff dash at base of primaries. Head, base of fore tibiæ, fore coxæ, and upper side of abdomen buff, the latter with a row of small black dorsal spots. Tibiæ and tarsi, and under side of abdomen very pale fawn color.

Exp. wings. 27 m. m. Length of body. 11 m. m.

1 ♂. Indian River, Florida.

Type. Coll. Hy. Edwards.

FAM. LITHOSIDÆ.

HYPOPREPIA INCULTA. n. sp.

Primaries dull mouse color, with pale dash along the median nervule and a black streak above it, only visible with a lens. Head, thorax and fringe concolorous. Secondaries very pale silvery drab, with pink tinge, chiefly at the abdominal margin. Fringes mouse color. Abdomen drab, with the tip dull orange. Under side same as the upper, but slightly paler. The legs and antennæ are dull mouse color.

Exp. wings. 26 m. m. Length of body. 9 m. m.

1 ♂. Tucson, Arizona. I. Doll.
Type. Coll. B. Neumoegen.

FAM. NOCTUIDÆ.

LYGRANTHOECIA PARMELIANA. n. sp.

Primaries ochreous drab, with a slight greenish tint. Basal space clouded with olive brown. T. a, line narrowly edged with white, and deeply toothed outwardly on the median nervure. T. p. line also white, with a slight sinuation in the middle, where it is lost in a brownish cloud. The central space is the palest portion of the wing. It is crossed from costa to internal margin by a narrow olive brown cloud, obscuring the large reniform spot. Sub-reniform obsolete. Behind the t. p. line is a dark olive brown shade, the margins paler, with black dots at the end of the nervules. Secondaries dusky, with a paler discal shade, and the costa also pale. Fringes of both wings alternately stone color and brown. Beneath, the margins are broadly dusky, with dusky discal spots. Centre of both wings paler. Thorax and abdomen ochreous drab.

Exp. wings. 24 m. m. Length of body. 12 m. m.
1 ♂. "Maryland."
Type. Coll. H. Schönborn. Washington.

CIRRHOBOLINA MEXICANA. *Behr.* n. var. *vulpina.*

Similar in all respects to *C. incandescens*, *Grote* (—Syneda Mexicana, Behr.) except that the posterior half of the primaries is dull foxy-red, bearing at first sight the appearance of a new species. The marks of primaries and secondaries agree so closely with the form mentioned that I cannot regard the present as other than a variation.

3 ♀. Prescott, Arizona. I. Doll.
Types. Coll. B. Neumoegen.

MELIPOTIS PERLÆTA. n. sp.

Allied to *M. pallescens*, *G and R.*, but with the colors of the primaries in much stronger contrast. Basal space fawn color, dark brown as it touches the t. a. line and covered with brownish scales. Costa pinkish for its basal, and deep buff for its posterior half. T. a. line oblique, not dentated. T. p. line with slight sinuation in the centre, on which rests a brownish patch. The space between is bright buff, except on the costa, where there is a brownish triangular mark. Reniform and sub-reniform very faintly indicated. The pale discal shade, common to all the genus, is almost ovate in shape, with dark markings around it. There are some faint gray shadings towards the internal margin. The sub-marginal line is fawn color, slightly shaded anteriorly with brown. Fringe fawn color. Secondaries sordid white, with broad blackish marginal band, obsolete at anal angle, and with two white blotches in the extreme margin. Fringe white. Under side wholly clear white, with the costa of primaries pink, a broad

marginal band and triangular discal spot dull black. Secondaries as on upper side. Thorax above, fawn color, with pinkish scales. Abdomen sordid white, with fawn-colored tint. Beneath, the thorax, abdomen and legs are clear white.

Exp. wings. 36 m. m. Length of body. 19 m. m.

Several examples.

Prescott, Arizona. I. Doll.

Type. Coll. B. Neumoegen.

CATOCALA DESDEMONA. n. sp.

Primaries rich wood-brown tint, with paler shades over the discal portion. The lines are all strong and well defined. Basal half line rich velvet black, slightly notched in the centre. Anterior line oblique, slightly dentate. It approaches the internal margin very close to the termination of the posterior line, which is very oblique from costa to second sub-costal nervure, where it forms a very long and sharp tooth. It then bends abruptly towards the lower end of the sub-reniform, where it is sinuato-dentate. The course is thence very abrupt to the internal margin. The reniform is brown, surrounded by a darker shade. Sub-reniform large, transversely ovate, paler, almost fawn-color, with brown and black scales. Across the posterior line is a fawn-colored shaded space, blending softly into the brown of the wing. The sub-marginal line is rather faint, and bears three black dashes from sub-costal to median nervule. Marginal lunules fawn color, with an orange tint. Fringes alternately fawn and brown. Secondaries rich orange, a little dusky along the abdominal margin. Median band widest in centre, nearly equal on its interior edge, and turning in a rather sharp hook to the abdominal margin. Sub-marginal band with four equal teeth about its middle on the exterior edge, It is nearly of equal width throughout, but becomes constricted near the anal angle, leaving an ovate patch joined to the main band by a narrow line. The inner edge of the band is without dentations. Fringe orange. Under side wholly rich bright orange, the primaries with median and sub-marginal band of black, the secondaries with the markings of the upper side repeated. All the fringes pale orange. Thorax concolorous with primaries, but with rather darker transverse band in front. Abdomen dusky orange.

Exp. wings. 62 m. m. Length of body. 25 m. m.

Four examples.

Prescott, Arizona. I. Doll.

Type. Coll. B. Neumoegen.

Probably nearer to *C. consors* than to any other species, but differing very widely in the markings of primaries, the median band of secondaries and the general color.

BOOK NOTICES.

BUTTERFLIES; THEIR STRUCTURE, CHANGES, AND LIFE HISTORIES, with special reference to American forms; being an application of the Doctrine of Descent to the study of Butterflies. With an Appendix of Practical Instructions, by SAMUEL H. SCUDDER. New York, Henry Holt & Co., 1881.

This book will be read by every Lepidopterist with mingled interest and disappointment; many highly important facts are given, and ingenious and probable deductions made from them; on the other hand, exploded fallacies are gravely used as proved facts, and from them necessarily erroneous general laws deduced. It is sufficient to mention the alleged fact that individuals of *Danais Archippus* develope and lay their eggs one after another for a year and a half, and to refer to the alleged parallel generations of *Argynnis Myrina* Mr. W. H. Edwards, years ago had shown the errors of observation and deduction involved in both of these cases, but here they appear in their original guise without note or comment.

Very few authors later than 1850 are quoted; the note on p. 204 fixes the date of the book as before 1877, when indeed the whole of it was delivered as a series of Lowell Lectures at Cambridge several years before 1877; however, different portions of this book had appeared in various magazines, as the story of *Myrina* in 1872, of *Archippus* in 1876 and other sections in 1877. This would be no disadvantage if the work had been properly revised with reference to the advances made in the last decade, but unfortunately this has not been done. The works of Weismann—since 1874 the best author on color pattern and seasonal dimorphism—are ignored, although twenty pages are devoted to the first of these subjects and nearly as many to the other. So are those of Paul Mayer—the only authority at present on the ancestry of insects—and *Hatscheck's Embryology of Lepidoptera* published several years ago, which singularly contradicts the statement on p. 10, that "very little is known * * of the formation of the embryonic caterpillar."

The drawings in the "Butterflies" are generally good, but some are very bad; for example the eggs of *Hypophlœas*, p. 7, *Philodice* and *Thoe*, p. 8. The latter looks something like a *Parnassius* egg, but in neither shape nor marking bears any resemblance to that of *C. Thoe*, which is very much flattened and studded with large starry projections. The drawings from Harris are inserted without any correction, or even mention of the very noticeable error which is pointed out in Harris' preface—the artist having provided four footed butterflies with a superfluous front pair of legs in thirteen instances. In spite of such matters of detail the work is valuable for any beginner bold enough to try to untangle such a Chinese puzzle as the author's nomenclature, which is entirely original and adopted by himself only, either here or abroad. As a reviewer in *Nature* points out, the recognized standard works of systematic nomenclature should be followed in a book intended for beginners and such innovations relegated to technical papers. The genera are those of Mr. Scudder's "Systematic Revision and were shown to be valueless by Messrs. Peabody and Mead in the *Canadian Etomologist*; if anyone cares for more information as to this matter, the last number of that journal (December 1881) may be referred to.

Particular attention is call to the introduction of English names as an improvement in the system of Linnæus. Open where you please and you meet such names as the Banded Purple, the Viceroy, the Monarch, the Blue-eyed Grayling, The Tiger Swallow-tail, etc., and usually without reference in the text by which the student may know what insect is meant, though this information may be obtained by reference to a glossary in the appendix.

Let us analyze one of the expressions, for example the Red Spotted Purple. *Basilarchia Astyanax*, meaning *Limenitis Ursula*. In the first place it is not red-spotted, in the next place it is not purple, in the next place there is no such genus as *Basilarchia*, and in the last place *Astyanax* is a resurrected name un-

known for a hundred years until recently disinterred by Mr. Scudder. The author speaks of "a continuous stream of Blue-eyed Graylings, p. 1, referring to *Satyrus Alope* called by Mr. Scudder *Cercyonis Alope*, and classed under the Meadow Browns in the appendix. In the text he calls it a Grayling, but as the color is not gray. why not a Brownling? and moreover a Grayling is a fish, (*vide* Izaak Walton), and the name must be regarded as preoccupied in ichthyology. We find *Xanthidia Nicippe*, the Black-bordered Yellow. The butterfly is orange not yellow, and the name might apply to *Colias Philodice* but not *Nicippe;* it is a misfit. *Philodice*, however, appears as the Clouded Sulphur, though it is not clouded, and on one page (189), this is called the Sulphur Yellow, creating perplexity. Indeed these instances and the reference on p. 287 to the FireWeed as having a blue flower, suggests that the author may have perceptions of color different from those which are usually considered the normal standard. Besides this misapprehension there is a constant effort to deduce general principles from too few facts, or even supposed facts; for example, the philosophical discussion upon the alleged fact that caterpillars in hatching, always devour their eggshells; in point of fact they frequently leave the shells almost intact. So with the incorrect statement that albino females of *C. Philodice* never appear in the first brood of the season, illustrating the law given by the author that "since melanism is a southern and albinism a Northern peculiarity, we should anticipate melanism in the hot and albinism in the cool season." Another instance is shown in the assumption that the polymorphic forms of *Lycaena Pseudargiolus* must be related as are the polymorphic forms of *Papilio Ajax*, and the philosophical discussions following this assumption.

The Appendix of practical instructions is admirable, and will be read with interest and profit by both the tyro and the specialist.

If the demerits of the book have been more touched upon than they merit it is because we all know that we may expect good results from Mr. Scudder, and the shortcomings of his work need to be pointed out all the more on that very account.

GENERAL NOTES, RARE CAPTURES, ETC.

Under this head we shall publish, from time to time, such notes with reference to Lepidoptera as we deem may be useful to our readers, and we ask for contributions to what we think may ultimately prove a valuable column of "PAPILIO."

EARLY APPEARANCE OF HYPHANTRIA CUNEA.—A very fine example of this species was taken February 10, 1881, at White Plains, N. Y.—ROBERT GREY.

EREBUS ODORA.—An example of this fine moth ♀, was captured at Parkville, L. I., on June 16th, 1880.—JOHN AKHURST.

INSECT ENEMIES.—Prof. I. H. Comstock, of Ithaca, N. Y., is preparing a report on the "Insect Enemies of Orchards and Gardens," and will be grateful to any Lepidopterists, or others, for information of destruction which may have come under their notice. The life-history of all species will be given as far as possible.

THECLA LÆTA.—A fine example of this species, one of the rarest of our North American Lycænidæ, was taken by me in July last, at Coalburgh, West Virginia. I believe that only about five other examples are known to collections.—THEO. L. MEAD.

ARCTIA NAIS.—This species and its variations, including *A. decorata*, has been extremely abundant during the past summer at Newburgh, N. Y., the insects coming freely to light. A few examples of the much rarer *A. persephone* have been taken under the same conditions.—EMILY E. MORTON.

WING VARIATION OF LEPIDOPTERA.—Mr. A. H. Swinton, of Guildford, England, is preparing a somewhat elaborate work upon this subject, which will probably be published early in the spring.—HY. EDWARDS.

EMERGENCE OF SPECIES FROM THE PUPA STATE.—It is well known to breeders of Lepidoptera that various species emerge from the pupa condition at different hours of the day. The following facts which have come under my observation may be of interest:

Attacus Atlas.....	emerges about	7	A. M.
Actias Luna.....	"	4	P. M.
" Selene.....	"	5	P. M.
Platysamia Ceanothi.	"	4	P. M.
" Gloveri..	"	4	P. M.
" Cecropia.	"	5	P. M.

I hope soon to be able to give more extended observations to the subject.—B. NEUMOEGEN.

LARVA OF PYRRHARCTIA ISABELLA.—When first hatched the larvæ of this fine moth are black, but after the second moulting one red ring appears, and one more at each successive moulting till the normal number is reached, after which no more moultings occur. The order of occurrence, as far as noticed, is one forward, then one back of the one that first makes its appearance. Sometimes there are only two segments with two red tufts on each; occasionally only three red tufts in all on the back of the larvæ. One form, with dirty brick-red tufts on four segments produces what seems to be a variety of this moth, it being lighter colored and the black spots are differently situated. In one case the abdominal portion of the body was quite dark colored; in others, the body was of the color of the wing, with the usual black spots.—N. COLEMAN, Berlin, Conn.

PAPILIO.

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DESCRIPTION OF SPECIES OF BUTTERFLIES TAKEN IN ARIZONA BY JACOB DOLL, 1881.

By W. H. Edwards.

Terias Gundlachia. *Poey*, Hist. Nat. de la Isla de Cuba, p. 246, plate 24, figs, 1 and 3.

Several examples of this fine species were taken in southern Arizona, in October. It is at once distinguishable from other orange species by the triangular prolongation of hind wing opposite cell. The male is deep orange, the female paler; the former has a broad, black costal border to primaries, and this extends down hind margin nearly to inner angle, gradually narrowing. The female has a narrow border next base, but broad at apex. Under side of primaries pale orange; of secondaries rather whitish, with fine streaks and dusting of ferruginous; beyond the disk a zigzag brown stripe from costal to inner margin, macular beyond cell. In the female wholly macular.

I formerly received a male of this species from the late Mr. Boll, taken in Texas.

Terias Mexicana. *Boisd.* Morris, p. 36.

This species appears to be common in southern Arizona, and there is much variation in the extent of the black border on secondaries.

Mexicana has occasionally been taken in the Mississippi valley, and Mr. A. W. Hoffmeister reports it at Fort Madison, Lee Co., Iowa.

Terias Damaris. *Felder*, ♀ Reise Novara, p. 198, no. 100.

Male.—Expands 1.3 inch.

Shape of T *Mexicana*, Bois.; much smaller, the hind wings produced to an angle on second median nervule, as in that species; color of upper side uniform lemon-yellow; a few black atoms

along costal edge of primaries, but the bases of both wings are quite free from black; a broad black border along the hind margins; on primaries this presents a deep, broad, sub-quadrangular sinus, covering the two median interspaces; the base of the sinus is uneven, with a further small excavation in the border; above the sinus the inner edge makes obliquely and with wavy outline for costa, which it strikes at about two-fifths the distance from apex to base; the border of secondaries has a projecting tooth opposite cell.

Under side of both wings paler, more white, but the cell and costa of primaries decidedly yellow; a slight sprinkling of dark scales along costal edge, and the ends of the nervules to apex are dotted black; also towards apex and on upper half of hind margin there is a little ferruginous along the edges; on upper end of arc of cell a black dot.

Secondaries have a little cluster of ferruginous scales on costa; a dash of ferruginous, with scales behind it, from outer angle half across wing, and in line a mark of same color in lower median interspace; on costal edge a few dots, and one on upper end of arc. This description applies to two males taken by Mr. Doll, but the third differs somewhat; the basal half of secondaries is lightly flecked with ferruginous streaks; in the lower median and in the sub-median interspaces, close to the nervule, and in the line of the ferruginous dash, are two little black points, and half way between the dash and hind margin are two points not so black; one in each of the two upper median interspaces; the ferruginous scales behind the dash are more densely laid on, and over a larger area than in the other males; otherwise, on both surfaces, this example resembles the other two.

Female.—Same size.

Color of primaries whitish, but yellow next base and over cell to costa; secondaries all yellow, but paler than male; both margins at base dusted black; the border as in male, with a similar sinus. Secondaries have no border, but the nervules at outer angle are edged black, next to margin; discal spot of primaries obsolete.

Under side of primaries nearly as upper, but deeper yellow at base and on cell; costa and apex dusted ferruginous; the discal spot distinct.

Secondaries wholly dusted with ferruginous; the marks as in male.

From 2 ♂ 1 ♀, taken in southern Arizona. I have also one male, formerly received from the Wheeler expedition. The description of the female answers very well to Felder's. No male seems to have been hitherto described, though Kirby, in Catalogue, gives ♂ *Damaris* as synonym of *Mexicana* ♀ Bois. Spec. Gen. 655. I have carefully compared that description with *Damaris* ♀ and it is not possible that the two are identical. Nor

is *Damaris* same as *Depuiseti*, Bois., Lep. Guatemala, p. 11, as Kirby states. Boisduval says the marginal border of primaries in *Depuiseti* is deeper than in *Mexicana*, also that the anterior border of secondaries is largely of a fine citron-yellow. Now, the whole of both wings of ♂ *Damaris* is citron-yellow, and the marginal border is not deeper than in *Damaris*. *Mexicana* differs much in its markings, shape of sinus, etc., and no doubt, *Damaris* varies considerably also.

PHYCIODES PICTA.

Melitæa Picta, ♂ Edw., Pr. Ent. Soc. Phila., 3, 201.

Canace ♂ Edw., Tr. A. E. Soc., 3, 206.

MALE.—Expands 1.1 inch.

Upper side black with fulvous and whitish or buff spots or bands, very much as in *Pratensis*, Behr; or fulvous and buff with very little black, there being much variation. In the lighter examples, the angular discal band on primaries is yellow-buff, and the fulvous spots of the next outer band are partly replaced by buff; the submarginal lunules are of same color, and there is a buff band across cell; on secondaries the mesial band is partly buff. So much buff with the fulvous gives these examples quite a gay appearance.

Under side of primaries mottled with pale yellow, or yellow-buff, fulvous and black, the apical third being yellow or buff; with same color the costal margin is broadly edged; there are patches of fulvous in and below cell, and in the median interspaces, the intervening ground being yellow or buff; at inner angle is a black patch, another at origin of lower median nervule, and below same; a curved band beyond cell and a wedge-shaped patch between this and apex. Secondaries yellow or yellow-buff, nearly immaculate. Some examples have two small patches of brown on hind margin, a cluster of brown scales at outer angle, and one or two dots near the arc; also two or three dots corresponding with the pupils of the extra-discal row of fulvous spots of upper side. Other examples have these last dots, one or two streaks between them and hind margin, and a few dots on costal margin.

FEMALE.—Expands 1.3 inch.

Upper side as in male, except that on secondaries the fulvous bands are diffused, and the black areas between them reduced to little more than lines; the fulvous is of uniform shade also, and in the discal band it is not replaced by yellow as in the male. Under side of primaries as in the male; secondaries yellow, with faint reticulated brown lines on basal area, extending a little beyond the middle of the wing; along hind margin a series of narrow brown crenations, and above these a series of small brown spots or points. By the uniform clear yellow, or buff, of hind wings and of much of primaries, *Picta* is easily distinguished from other western species.

Since seeing the many examples of *Picta* in Mr. Neumoegen's

collection I am satisfied that P. *Canace* is identical. It was originally described from a ♂ received from Arizona, while *Picta* was described from several males brought by the late Mr. Ridings from Nebraska. The northern examples are darker, but all, whether from Nebraska, New Mexico or Arizona, agree in the coloration of under side. Mr. Chas. Dury informs me that he found *Picta* abundant in New Mexico, on his recent visit.

LIMENITIS URSULA. *Fabr.*

Var. *Arizonensis.*

Differs from the type in that the primaries are much produced; so also are the secondaries, the band at upper branch of median being much more angulated. The green extra-discal area is broken into spots by the black borders of all the nervules; the marginal spots on primaries are restricted to a single series, corresponding to the inner row on *Ursula* type, there being no trace of sub-marginal markings; these spots, also, are not lunular, but are small, and on upper half of wing scarcely more than points. Secondaries have two rows along margin, the outer small, lunular, the inner rounded, except the three posterior, which are lunular, but all are smaller than in *Ursula*,

The under side is more like *Ursula*, there being on both wings a double series of lunular spots, but the inner one is decidedly white on secondaries; there is also an absence of the white found in *Ursula* about apex and on middle of costa of primaries.

Several males were taken about Tucson, and later in the season, in southern Arizona. I formerly received four ♂ of this variety from the north of Arizona, taken by the Wheeler expedition. There is a gradual departure from the white-banded form *Proserpina* (co-form of *Arthemis*) of northern New York, first into the type seen in southern New York, and Pennsylvania to Chicago, with occasonal traces of the band, then into the typical *Ursula*, wholly free from the band, as found in Virginia, then this southwestern form, in which the shape of the wings alters and the markings have somewhat changed.

So far no females have been taken.

LIMENITIS WEIDEMEYERII. *Edw.*

aber. sine-fascia.

This extraordinary example lacks the broad, common white band on both surfaces, also the white patch in cell of primaries; all the sub-marginal and apical spots are present and as in the type.

Taken near Tucson.

LIMENITIS EROS. *Edw.*

var. obsoleta.

Color faded, very like Danais *Strigosa*, Bates, but with the characteristic white spots of *Eros*, on the inner side of the black mesial band of secondaries, and on both surfaces.

1 ♂ 1 ♀ taken in southern Arizona, in October.

APATURA LEILIA. *Edw.* But. N. A. Vol. 2. ♂.

Female.—Expands 2.25 inch.

Upper side ferruginous-brown, lighter than the male; the apical spots of primaries pure white, as are also the three at end of cell, but those in the median interspaces are yellowish (in male white); three black ocelli as in male. Under side as in male, the base and posterior half of primaries being castaneous, the rest, and all of secondaries, pearl-gray upon a brown sub-color; the space in cell of primaries between the two dark spots gray-white (in male white); the ocelli on both wings repeated, enlarged, with yellow rings, and in centre clusters of blue scales.

A large number of both sexes were taken in southern Arizona, in October. The male was described from three examples brought in by the Wheeler expedition.

THECLA ITYS. n. s.

Male.—Expands 1.3 inch.

Upper side brown; primaries have smooth oval sexual spot on disk; secondaries have a few scales of fulvous in lower median interspace near margin and a whitish edge to margin between tail and angle; tail single, of median length, tapering, black, with white fringe on posterior side and at tip; fringes of wings fuscous next margins, sordid-white outside, between tail and angle long, whitish, the ends of the hairs there black.

Under side light gray-brown; primaries have a sub-marginal row of obsolescent spots, and an extra discal row of small rounded black spots, the one on sub-median interspace not always present; each spot edged with white; on the arc a faint brown streak. Secondaries have a complete sub-marginal row of black points, or small clusters of scales, on whitish ground; at anal angle a velvet-black patch, over which are a few orange scales and then black; in next interspace is a bluish spot, with black scales above; and in lower median interspace a small orange spot with black above and below; across disk a row of small round black spots in white rings; a brown streak on the arc.

Body above brown; beneath, thorax gray-white, abdomen yellow-white; legs gray; palpi white; antennæ ringed, black and white; club black, the tip ferruginous.

Female.—Expands 1.3 inch.

Upper side same color as male; a small clear fulvous spot near margin. In one example there is a second tail, very short, black with white tip. In another this tail is wanting. Under side as in male, but the discal spots are a little larger, as also is the orange spot on secondaries, and the next three black spots anterior to this have yellow scales on lower side.

From 1 ♂ 2 ♀ taken at Prescott.

The species belongs to the *Acadica* group

THECLA LEDA. n. s.

Male.—Expands .85 inch.

Upper side pale black, along inner margin of primaries and base, and inner half of secondaries, violet-blue; on primaries a dark, rough stigma; secondaries have two tails, the anterior one short, the other long, both black with white tips; a dark patch at anal angle, and two in the next adjoining interspaces on the margin.

Under side gray-brown; both wings edged by a brown line, next which the scales are whiter than elsewhere, giving the appearance of a second line, white; primaries have an obscure submarginal series of brown lunules, an extra-discal, somewhat macular, band covering whole wing, brown, with no scales, and edged without by white, at the end of cell a brown bar, with red scales and white on either side. Secondaries have a clouded marginal border, indistinct brown lunules running through a whitish ground; a black anal patch, over which is a red edging, red also on the inner margin, just above; a rounded red spot, with black at the margin, between the two lower branches of median; across the disk a macular band from margin to margin, bent at a double angle, or W, below median, brown, much covered with red, and edged outside by white; an obscure streak at end of cell, and a brown and red bar above cell half way between the band and base.

Body above fuscous, the abdomen whitish, with orange scales; under side of thorax and abdomen white; legs brown and white; palpi white, brown above and at tip; antennæ fuscous, narrowly ringed with white; club black, fulvous at tip.

From 2 ♂ taken near Prescott.

This pretty species is allied to *Clytie*, Edw., described from a single female, in Field and Forest, Vol 3, page 232, 1877, and at first view I thought these Arizona examples were the males of that species. *Clytie* was taken by Mr. Boll at San Antonio. Secondaries are wholly light blue, color of Lycaena *Pseudargiolus*, and so are the inner margins of primaries, whereas *Leda* is violet-blue; the under side is marked with red as in *Leda*, but more heavily. Both wings are edged by a red line, and hence it differs from *Leda*. So the outer tail is white, and the other black, partly fringed on one side by white, whereas in *Leda* both are black, with only the extreme tip white. The abdomen of each is white, but *Leda* has much orange on upper side. So that the two forms are distinct, though of same sub-group.

I take the opportunity to reprint the description of Thecla *Clytie*, as Field and Forest is no longer published, and the volumes are not readily accessible.

THECLA CLYTIE. Field and Forest, 111, p. 88 1877.

Female.—Expands .8 inch.

Upper side of primaries blackish, except on the inner margin up to cell, where the color is light blue, forming a pretty regular arc of a circle, terminating at three-fourths the distance from

base to inner angle. Secondaries wholly light blue, color of Lycaena *Pseudargiolus*, pale next outer angle and along inner margin; hind margin edged by a black line, preceded by a white one, and on that, towards outer angle, is a narrow fuscous edging; some small patches of fuscous also near inner angle along same line; in lower median interspace is a marginal black, rounded spot, and at inner angle, an orange spot; furnished with two tails, the outer one short, white; the inner one very long, threadlike, black, partly fringed on one side by white, white at tip; fringes of primaries fuscous, of secondaries white, not pure but a little gray, and at the ends of the middle nervules darker than elsewhere.

Under side gray-white, pale on disks, and darkest on hind margins; both wings are edged by a fine red line, and are crossed a little beyond the middle by a common series of elongated red spots edged with white; this series on primaries stops at lower branch of median, and on inner margin of secondaries takes the form of W; discal spot of primaries a long, red bar; on secondaries there is a small red spot on costal margin near base, and two smaller ones in line with it on middle of basal area; primaries have also a sub-marginal row of pale fuscous, sub-lunate spots, and the marginal area of secondaries is clouded with light and dark, not forming distinct spots; between the tails a black triangle upon a large orange spot, and at the angle a black spot overtopped by orange; the under side of the tail is also red next the margin.

Body above black, covered with blue hairs, the abdomen white; beneath wholly pure white; legs white, annulated broadly with black on outer sides; palpi white; antennæ annulated black and white; club tipped with ferruginous.

From 1 ♀ taken at San Antonio, Texas. So far as I know this specimen is still unique.

THECLA INES. n. s.

Male.—Expands .80 to .85 inch.

Upper side wholly lavender-blue, except the apical area of primaries, which is brown-black; secondaries have a rounded black marginal spot between the tails and an indistinct spot next anal angle; the posterior tail is long, and both are slender, black, tipped white; fringes sordid-white next the margin, brown at ends.

Under side of both wings cinereous, lightest colored over extra-discal part of secondaries. Under a glass the scales are seen to be alternately gray and brown, but on secondaries, beyond disk, the gray scales prevail, and this area is clouded, light and dark; primaries have a sub-marginal line of pale brown lunules; an extra-discal, nearly straight black stripe, edged on the outer side by white; a straight black bar on arc; secondaries have an irregular black line across disk, forming a W near inner margin; on the arc a black streak; a brown patch at inner angle and a faint spot between the tails.

Body above blue, on abdomen mixed with brown; beneath, thorax cinereous, abdomen lighter; legs gray and black; antennæ annulated black and white; club black, tip ferruginous.

Female.—Expands about 1 inch.

Rather more than half of primaries is black, the blue being restricted to posterior part, and not reaching inner angle; the blue is also a shade darker than in male; secondaries blue, except on the costal margin, which is black. Under side as in the male, but in the mesial band of secondaries ferruginous scales appear.

From a large number of examples taken in southern Arizona, in October.

This species belongs to same group with *Leda* and *Clytie*.

COPÆODES MYRTIS. n. s.

Male.—Expands .8 inch.

Upper side bright red-fulvous; hind margin of primaries bordered by pale brown, narrowly next inner angle, widening above and at apex; the nervules brown at extremities; costal edge brown; at outer end of cell an indistinct dark mark; secondaries have a narrow brown border from outer angle to lower median nervule; the inner margin narrowly and the costal margin broadly edged brown.

Under side of primaries brown, yellowish at tip; from base to near inner angle a black stripe; color of secondaries wholly yellowish.

From 1 ♂ taken near Tucson.

PAMPHILA ARABUS. n. s.

Male.—Expands 1.3 inch.

Upper side glossy dark brown; primaries have three small spots on costal margin in straight transverse line, and two oblique to them in median interspaces, all translucent; a whitish point in sub-median interspace in line with the two spots, and a similar point in cell near outer end; fringes brown.

Under side of primaries brown, the hind margin, from apex, two-thirds distance to inner angle, clouded dark gray; secondaries gray-brown, shading into brown on middle of disk, and slightly gray again along hind margin; the brown area lies on middle of disk and to costal margin. Body, above dark brown, below gray; legs light brown; palpi whity-brown; antennæ, black above, yellowish below; club black, tip ferruginous.

From 1 ♀ taken in southern Arizona, in October.

PYRGUS NEARCHUS. n. s.

Male.—Expands 1.2 inch.

Upper side brown-black, over basal areas blue-gray; primaries have a row of white points, and an incomplete sub-marginal row, only distinct next inner margin; on costal margin, three-fourths the distance from base to apex, are four white spots in transverse line; outside these, near hind margin, a double spot, and in upper median interspace, beneath the costal line, a single spot; across

both wings a broad white mesial band; secondaries have a marginal row of small spots, and a row of sub-marginal lunules on posterior half of the wing; fringes alternately white and black.

Under side of primaries pale greenish-brown, the spots and band repeated, the former confluent and enlarged; costal margin whitish: secondaries clouded, greenish-brown and sordid-white, the band not clearly defined; inner margin white. Thorax and abdomen above blue-gray, below, thorax white, abdomen pale-brown; legs buff-white; palpi white; antennæ black above, whitish below; club black, whitish below.

From 4 ♂ taken in southern Arizona, in October.

EUDAMUS HIPPALUS. n. s.

Male.—Expands 1.6 inch.

Upper side glossy-brown; primaries have, at three-fourths the distance from base to apex, four minute, whitish, semi-transparent spots on costal margin, three of them in perpendicular line, the fourth a little outside; a similar spot in lower discoidal interspace, a small rectangular spot in upper median and a large rhomboid in lower median interspace; these three in an oblique line; a bar across cell just over the rhomboid, and above cell a dash nearly parallel to costal edge; fringes of primaries alternately fuscous and dull white, the dark shade prevailing at apex, of secondaries white with short brown hairs at the ends of the nervules, but which do not entirely cross the white.

Under side brown, much dusted with gray scales, especially over secondaries and at apex of primaries; inner margin of primaries yellowish; secondaries crossed by two dark bands, one on disk, the other beyond; there is also a demi-band near base; the spots of primaries repeated and a little enlarged, and in addition there is a light brown patch lying between the outer spots and opposite cell.

Body brown above, beneath, thorax gray-brown, abdomen whitish, with a brown line on venter; legs gray-brown, the inside of tibiæ white; palpi white with brown hairs; antennæ black above, annulated with yellow beneath; club black above, yellow beneath, and above also, at base, tip ferruginous.

From 2 ♂ taken at Tucson and at Prescott.

The species is near *Cellus*, Bois.

MEGATHYMUS NEUMOEGENI. n. s.

Male.—Expands 2 inches.

Upper side black and orange-fulvous; costal margin brown; along the hind margin of both wings a broad black band, erose within and opposite cell on primaries incised; on costal margin, beyond cell, a black patch which extends to median nervure, and there connects with a larger patch which occupies most of the disk; between this and the border a broad, orange-fulvous band from margin to margin, but restricted opposite cell; on costa a fulvous patch anterior to the black one; the basal area darker fulvous.

Secondaries have the disk black, much concealed by long fulvous hairs, and between this and the border a light band as on primaries; fringes alternately fuscous and sordid-white, white prevailing on posterior half of secondaries.

Under side of primaries dark brown at base and on posterior half of wing quite to hind margin, the apex densely sprinkled with gray-white scales; the orange band repeated, but above median replaced by white; the patch on costa repeated.

Secondaries brown, wholly sprinkled with gray-white scales, most densely beyond disk, and this area is somewhat clouded; a small white spot near base below sub-costal, otherwise immaculate.

Body brown; beneath, thorax gray-white, shading towards abdomen into gray-brown; legs reddish-brown, with many gray scales and hairs; palpi white; antennæ brown above, whitish below; club, black above, whitish below, tip dark ferruginous.

Female.—Expands 2.2 inches.

Less black, more orange fulvous; the borders as in the male; in one example the black patches are nearly as in the male, but in the other they are greatly reduced. In this last one, on under side of primaries, the orange band is broad and bifid, embracing the costal patch; secondaries, in addition to the white spot near base, have a white patch, a cluster of white scales, denser than elsewhere, near inner angle.

From 1 ♂ 2 ♀ taken in southern Arizona. Another ♀ was taken, making four examples. They are described as sitting in the sunlight, on leaves of Agave, and flying when disturbed to the adjoining cliffs of rocks, alighting generally out of reach of the net. I take pleasure in naming this species for Mr. B. Neumoegen, whose zeal has led him to send a special agent, these two seasons, to explore New Mexico and Arizona for lepidoptera. By great sacrifices rich results fortunately have been attained, as was fitting. In the *Heterocera*, particularly, numbers of new and rare species have been taken.

LIST OF SPECIES OF BUTTERFLIES TAKEN IN ARIZONA BY JACOB DOLL, 1881.

Papilio Daunus..... Bois.
" Philenor..... Linn.
Pieris Protodice..... Bois.
Terias Nicippe..... Cram.
" Gundlachi..... Poey.
" Mexicana..... Bois.
" Damaris..... Felder.
" Lisa..... Bois
Danais Berenice..... Cram.
" Strigosa..... Bates.
Geirocheilus Tritonia..... Edw.
Satyrus Meadii..... "
Libythea Bachmanni..... Kirtl.
Apodemia Mormo..... Feld.
" Nais..... Edw.
" Palmeri..... "
Charis Australis..... "
Thecla, Leda..... "
" Ines..... "
" Itys..... "

Melitæa Dymas..... Edw.
" Bollii..... "
" Minuta..... "
Phyciodes Pratensis.....Behr.
" Marcia.....Edw.
" Picta..... "
Eresia Texana..... "
Synchloe Adjutrix..... Scud.
" Crocale ..... Edw.
Grapta Satyrus..... "
Junonia Lavinia..... Cram.
Limenitis Ursula.....Fab.
v. Arizonensis.....Edw.
" Weidermeyerii..... "
" aberr. sine-fascia...
" Eros..... "
v. obsoleta..... "
Heterochroa Californica.....Butler.
Apatura Leilia..... Edw.
Neonympha Rubricata..... "
" Henshawi..... "
Lycaena Alce..... "
" Fea..... "
" Marina.....Reak.
Copaeodes Procris..... Edw.
" Myrtis..... "
Pamphila Taxiles ..... "
" Comma v. Juba.....Scud.
" Ottoe .....Edw.
" Rhesus..... "
" Uncas..... "
" Arabus..... "
" Eufala..... "
Amblyscirtes Aenus..... "
" Simius..... "
Pyrgus Nearchus..... "
" Tessellata..... Scud.
Systasea Zampa..... Edw.
Pholisora Catullus.....Cram.
" Pirus.....Edw.
Eudamus Hippalus..... "
Megathymus Neumoegeni..... "

30–60 *species in all.*

LIST OF BUTTERFLIES COLLECTED ON THE PACIFIC COAST, PRINCIPALLY IN CALIFORNIA, IN 1876, WITH NOTES ON THEIR LOCALITIES AND HABITS.

By R. von Osten Sacken.

Papilio Daunus. *Bdv.* Yosemite, June 12; Ogden Cañon, Utah, August 2.

Papilio Rutulus. *Bdv.* Los Angeles, about the end of February; San Bernardino, March 15; San Rafael, (Marin Co.,) Geysers, (Sonoma Co.,) very common in April and May; Yosemite Valley, June.

Papilio Eurymedon. *Bdv.* Marin Co., April; Geysers, Sonoma Co., May 5. On road from Clarks to Big Trees, Mariposa Co., about 5000 feet altitude, June 3; Yosemite, June 9.

Papilio Zolicaon. *Bdv.* Marin Co., early in May; Webber Lake, at an altitude of about 8000 feet, July 24. This species appears to be fond of flying on the tops of hills. I saw it in such positions in Marin Co., as well as at Webber Lake, and at Lake Tahoe. The latter is about 6200 feet altitude.

Papilio Philenor. *L.* Very fine examples in Marin Co., in April and May. In San Rafael the caterpillars went into chrysalis about the end of June.

Parnassius Clodius. *Men.* Webber Lake, Sierra Co., July, quite common.

Parnassius Smintheus. *Dby.* Georgetown, Colorado, 8500 feet altitude. Rare and rather worn, August 12.

Pieris Venosa. *Scud.* Very common in Marin Co., from the end of March to the beginning of May.

PIERIS CASTORIA. *Reakt.* San Rafael, etc.; May 10.

ANTHOCARIS AUSONIEDES. *Bdv.* Sonoma Co.; April 27.

ANTHOCARIS HYANTIS. *Edw.* Geysers, Sonoma Co., May 5; Yosemite, June 13.

ANTHOCARIS REAKIRTII. *Edw.* On sea shore, Sta. Barbara, February 6; San Bernardino, March 12; Marin Co., end of April and beginning of May. Not rare.

MEGANOSTOMA EURYDICE. *Bdv.* Lagunitas, Marin Co., April 15.

COLIAS EURYTHEME. *Bdv.* Yosemite Valley, June 11; Lake Tahoe, 6200 feet, July 19.

COLIAS KEEWAYDIN. *Edw.* Common in Marin and Sonoma Counties, end of April; Yosemite, June 5.

COLIAS MEADII. *Edw.* Foot of Gray's Park, Colorado. Altitude 12,500 feet; August.

PYRAMEIS ATALANTA. *L.* Marin and Contra Costa Counties; July.

PYRAMEIS CARDUI. *L.* Sta. Barbara, January 25; common. Los Angeles, March; Webber Lake, July 29; Fort Bridges, August 7; Cheyenne, August 21.

PYRAMEIS CARYÆ. *Hbn.* San Bernardino, March 12. Small and worn. Marin Co., April 1; Webber Lake, July 27.

VANESSA CALIFORNICA. *Bdv.* Marin Co., April 15; Lake Tahoe, July 19. Very dark specimens.

VANESSA ANTIOPA. *L.* Yosemite, June 12. Common. Lake Tahoe, July 19; Humboldt station, Nevada, July 29, very large. Fort Bridger, Wyom., August 7.

JUNONIA COENIA. *Bdv.* Yosemite, June 9; Summit Station, Sierra Nevada, 7000 feet, July 17.

GRAPTA SATYRUS. *Edw.* Marin Co., April 2.

GRAPTA SILENNS. *Edw.* Lagunitas Creek, Marin Co., April 15.

LIMENITIS LORQUINI. *Bdv.* Marin and Sonoma Cos., May 10–30. Common. Yosemite, June 14; Webber Lake, July 17.

LIMENITIS CALIFORNICA. *Butl.* Marin Co., with the preceding but much less common, May; Yosemite, June 9.

LIMENITIS WEIDEMEYERII. *Edw.* Ogden, Utah, August 2; Fort Bridger, August 7; Manitou, Colorado, August 18.

LIMENITIS MISIPPUS. *Godt.* Fort Bridger, Wyom., August 27. Not rare.

ARGYNNIS MONTICOLA. *Behr.* Lake Tahoe, July 19. Common.

ARGYNNIS CORONIS. *Behr.* Ogden Cañon, Utah, August 12.

ARGINNIS LETO. *Behr.* With the preceding.

ARGINNIS EURYNOME. *Edw.* Fort Bridger, Wyom., August 12.

ARGYNNIS EPITHORE. *Bdv.* In the coast range, among the Redwoods, (Sequoia sempervirens,) between Sta. Clara and Sta. Cruz. Quite common, May 22.

MELITÆA CHALCEDON. *Bdv.* Emerged from chrysalis in Los Angeles, March 16. Common around San Francisco in May; Yosemite, June.

MELITÆA EDITHA. *Bdv.* Crafton's, near San Bernardino, March 12. (Determined by Dr. H. Behr).

MELITÆA PALLA. *Bdv.* Marin and Sonoma Cos., April and May; Yosemite, June.

MELITÆA NUBIGENA. *Behr.* Between Glacier Point and Snow's, Yosemite Valley. Altitude about 7000 feet. Very common on July 10.

PHYCIODES MYLITTA. *Edw.* San Rafael, July 17.

PHYCIODES PRATENSIS. *Behr.* Marin Co., April. Common.

The species captured before July 15 were determined by Mr. Henry Edwards, those taken after that date, by Mr. Sam'l H. Scudder. One exception is noted.

A NEW VARIETY OF CATOCALA

By G. R. PILATE, Dayton, Ohio.

CATOCALA CLINTONII.—*Grote.* Var. *Helene.* n. var.

In order that my description may be better understood, I will make it in comparison with *Clintonii.*

Expanse 2 inches.

It is exactly the same size and shape of Messrs. Grote and Strecker's figures of *Clintonii*; and of two specimens, ♂ and ♀, in my own collections.

Thorax *darker* than in *Clintonii*, and more speckled with black.

The thorax and collar are of an uniform color, while in some five or six examples of *Clintonii* that I have seen, the color is brownish, tipped with a well defined black line, below which is a white or grayish one. Abdomen a little more brownish, than in *Clintonii.* Upper surface; primaries *much darker*, especially in the middle area, than in *Clintonii;* and covered with blackish specks; basal line well marked; t. a. line a little more distinct than in *Clintonii*, and differently shaped; in *Clintonii*, starting from the costa, it makes a long sharp tooth *posteriorly*, and then curves inwardly to the black basal dash; while in *Helene* the tooth is small and points *anteriorly;* the line curves irregularly across the cell, where it forms another tooth pointing anteriorly: from there to the base it is similar to *Clintonii;* t. p. line also differs from *Clintonii;* the two teeth are unequal and *blunt;* the second one being very small, and rounded at the point; while in *Clintonii* they are both large, *sharp* and of nearly equal length; from the teeth the line is undulating and continues down to the base of the wing, without showing the long black sinus, which occurs in *Clintonii;* the sub-marginal line is whitish in color;

between it and the t. p. line is a brownish shade; the marginal line is without dentations, and not scalloped as in *Clintonii;* sub-marginal space streaked with black along veins 1 and 2, but not on veins 6 and 7 as in *Clintonii;* the median shade is very heavy and extends from the costa to the lower anterior border of the reniform; the reniform is brown, bordered posteriorly with white, and anteriorly by the median shade; sub-reniform hardly visible. Black basal dash of *Clintonii* totally wanting. Secondaries; the median band is not *contracted* near the centre, as in *Clintonii;* the marginal band is very nearly *twice* as wide as that of *Clintonii*, and the separation near the anal-angle not so well marked as in Mr. Strecker's figure, or in the examples of *Clintonii* that I have seen; but not *entirely* connected, as in Mr. Grote's figure, Pro. Ent. Soc. of Phil., vol. 3, plate 3, fig. 4; the marginal yellow spot shows but slightly; the fringe is not as deep as in *Clintonii*, and is much darker. Under surface; bands all much wider than in *Clintonii*, and consequently giving it a much darker appearence; the marginal band not showing the separation. This var. is described from one ♀ taken at sugar, June 18th, 1880. I took a ♂ and ♀ *Clintonii* the same evening, and another ♂ the following evening; those being the first and and last of that species taken in this locality. Though differing *considerably* from *Clintonii*, I am satisfied it is only a var. of that species. I sent my type of *Helene* to Mr. Hy. Edwards last winter, and he said he had never seen one like it, and did not know what it was. On the strength of his assertion, I have named and described it.

During the past season I took two specimens of Catocala *Robinsoni*, var. *Curvata*. French; both of them were ♀.

FOOD PLANTS OF PLATYSAMIA CECROPIA.

[From papers read before the Natural History Society of Toronto, Dec., 1880, and Dec 1881, by WM. BRODIE.]

The following list is compiled from researches made in the County of York, Ontario, during the last 17 years.

The finding of a cocoon on a plant is not held to be conclusive that the larva fed on that plant; all such cases, when unsupported by other evidence, have been rejected.

The plants are held to be such as a perfect female Cecropia, at liberty, will select as food for her young.

The list is, no doubt, quite imperfect, and in a few years will be largely supplemented:

ORDER. TILIACEÆ.

Tilia Americana, Linn.
" *Europœa*, Linn.

ORDER. ACERACEÆ.

Acer spicatum, Sam.
" *saccharinum*, Warz.
" *dasycarpum*, Ehr.
" *rubrum*, Linn.
Negundo aceroides, Moen.

ORDER. ROSACEÆ.

Prunus Americana, Marsh.
" *domestica*, Linn.
" *Pennsylvanica*, Soi.
" *Virginiana*, D. C.
" *Serotina*, D. C.
" *vulgaris*, Linn.
Spirœa opulifolia, Linn.
" *salicifolia*. Linn.
" *tomentosa*, Linn.
Cratægus coccinea, Linn.
" *tomentosa*, Linn.
" *Crux-galli*, Linn.
Pyrus Malus, Linn.
" *communis*, Linn.
" *coronaria*, Linn.
" *arbutifolia*, Linn.
" *Americana*, D. C.
Amelanchier Canadensis, Lorr. and Gr.

ORDER. GROSSULACEÆ.

Ribes Floridum, Linn.
" *var. officinale*, Linn.
" *rubrum,var.officinale*,Linn.

ORDER. CAPRIFOLIACEÆ.

Sambuscus Canadensis, Linn.
" *pubens*, Michx.

ORDER. ULMACEÆ.

Ulmus, Americana, Linn.
" *racemosa*, Thom.
" *fulva*, Michx.

ORDER. CUPULIFERÆ.

Quercus alba, Linn.
Fagus ferruginea, Ait.
Corylus Americana, Walt.
" *rostrata*, Ait.
Carpinus Americana, Michx.

ORDER. BETULACEÆ.

Betula alba, Linn.
" *excelsa*, Ait.
" *lenta*, Linn.
Alnus incana, Willd.
" *serrulata*, Ait.

ORDER. SALICACEÆ.

Salix humilis, Mar.
" *lucida*, Muhl.
" *viminalis*, Linn.
" *alba*, Linn.
Populus tremuloides, Michx.
" *balsamifera*, Linn.

It will be seen that this species has been observed to feed on 49 specimens of plants, which belong to no less than 20 genera, and 9 Natural orders. I hope soon to be able to give the result of my observations upon other species of *Bombycidæ*.

NOTES ON LEPIDOPTERA.

ZEUZERA ÆSCULI L.—A fine example of this well-known European species was taken in a spider's web in Hoboken, N. J., in June last, by Mr. Schmitz. It was alive, and was endeavoring to escape from the web. The specimen is now in the collection of Mr. B. Neumoegen.—JACOB DOLL.

A POWERFUL INSECTICIDE.—The Department of Agriculture, at Washington, has just issued a circular with reference to *Pyrethrum roseum*, claiming that this plant is highly destructive to Insect life. It would appear likely to become of great service in preserving cabinet specimens from insect pests.—EDITOR.

SWARMING OF COLIAS PHILODICE.—In August last, on the White Plains R. R., near Scarsdale, I observed, settling on the track of the railway, for a space extending over a mile, immense swarms of this species. Their number can only be expressed by "myriads." When disturbed they flew up in clouds, settling again very quickly at a little distance. They were nearly all ♂ ♂, my estimate at the time being that there was about 1 ♀ in 500 examples. I could see no noteworthy variation in the many specimens captured, save a trifling occasional difference in the width of the marginal band. All the specimens seemed fresh, and in good condition.—EDITOR.

BUTTERFLY PARASITES.—An admirable paper has just been published by Dr. A. S. Packard, Jr., in the Proc. Bost. Soc. Nat. History, in which the author describes 22 species of *Ichneumonidæ*, known to be parasitic on our butterflies. The forms mentioned belong to 10 genera, viz.: *Ophion*, *Campoplex*, *Trogon*, *Ichneumon*, *Microgaster*, *Pteromalus*, *Encyrtus*, *Eulophus*, *Entedon*, *Trichogramma*. The descriptions are made with Dr. Packard's usual care.—EDITOR.

HEPIALUS GRACILIS, GRT.—In August, 1880, I took, in one day, about twenty imagos, sitting against the trunks of trees, in a cemetery of St. John, N. B. A. W. PUTMAN CRAMER.

RHODOPHORA FLORIDA, GUEN.—On July 17, 1881, I found these beautiful noctuids, in the middle of the day, sitting in the flowers of *Oenothera biennis*. L. The colors of the insect being almost identical with those of the half-closed flowers, made it very hard to distinguish them. On the 7th of August I found, in the same spot, the young larvæ feeding on the interior of the seed pods; their heads and half their bodies being inside, while the rest of their body protruded outside through a hole, gnawed in the side of the pod. Altogether I found seventy larvæ in a small spot in Central Park, and a few near Flushing, L. I.—A. W. PUTMAN CRAMER.

INSECT PESTS IN CALIFORNIA.—From the Report of the California Fruit-Growers' Association (S. Francisco, 1882), we learn that the Codlin Moth (*Carpocapsa pomonella*), is causing a great deal of damage in the orchards of the State. It appears, from the address of President C. H. Dwinelle, that this destructive species was unknown west of the Rocky Mountains until 1873, in which year it was introduced among some fruits sent from the eastern side of the continent to the State Fair, at Sacramento. The insect has spread with such rapidity that now few parts of the State may be said to be free from its attacks. In the Report there is also an allusion to two other species of Lepidotpera, said to occasion damage, viz.: *Clisiocampa Americana* and *Orgyia leucostigma*. These, however, are wrong determinations, neither of the species being found on the Pacific Coast. The insects referred to are probably *Clisiocampa Californica*, Pack., and *Orgyia vetusta*, Bdv.—EDITOR.

DWARF BUTTERFLIES.—Among some insects recently received by Mr. J. Akhurst, from the Upper Amazon, were several examples of the well-known tropical species, *Gynecia Dirce*, L. and *Gonepteryx Leachiana*, Godt., which are little more than one-half of the usual size.—EDITOR.

ENTOMOLOGICAL SOCIETY.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] March, 1882. [No. 3

NOTES ON VARIATIONS IN SOME JAPANESE LEPIDOPTERA.

By CHARLES ISHIKAWA, University of Tokio, Japan.

Having had a summer's tour in the southern extremities of Hokkaido, I caught a few species of butterflies which are more or less interesting, as they present peculiar local variations in comparison with those found on the main island. These species are:

1. ARASCHNIA FALLAX. *O. Janson.*

This species is common in the northern part of the main island, abounding in the mountainous districts. A species very much allied to this was found by Mr. Fenton in the shady wood near Sapporo, Hokkaido, and described by him under the name of *A. Obscura.*

2. LEUCOPHASIA AMURENSIS,. *Méuétriés.*

The representative of this species (figures 1, 2) was found in Hokkaido, with rounder wings and paler apical patch. (Figs. 3, 4.)

Mr. Fenton has kindly described this species for me as follows:

LEUCOPHASIA MORSEI. *Fenton.*

Allied to L. Amurensis, *Ménétriés.*

Wings rounder; not produced at the apex; the black apical patch, lighter.

Average expanse of

L. Amurensis, ♂, 1″ 11½‴; ♀, 2″ 0⅓‴.

L. Morsei, ♂, 1″ 11‴; ♀, 2″ 0‴.

Together with the roundness of the wing in the Hokkaido species, it will be seen that the fourth and the fifth subcostal

veinlets are shorter than those of *L. Amurensis*, showing thus either the rounding of the wing had taken place in *L. Morsei* or the reverse had occurred in *L. Amurensis*, which changes depend entirely upon the original place of the species.

In Figs. 5 and 6 I have traced out the outline of the wings comparatively, the dotted line showing the Hokkaido species *L. Morsei*, and the plain line that of the main island. Fig. 5 shows the comparative outline of the male wings, and Fig. 6 of the female. Figs. 7 and 8 show the comparative outline of the male and female insects; Fig. 7 showing the outline of *L. Morsei* and Fig. 8 that of *L. Amurensis*; the dotted line shows the ♂ and the plain line the ♀.

3. ARGYNNIS RABDIA. *Butler*. Fig. 9.

The Hokkaido representative of this species has its wings slightly rounded, Fig. 10; the inner deep brown borders of the median band between the costal vein and the first subcostal veinlet straight, and the outer borders of the same bent inward, the reverse taking place in the species of the main island. Many other differences occur between these species, which are, however, not constant.

In Fig. 11 the outline of the primaries of the male specimens are compared, and in Fig. 12 that of the secondaries, together with the borders of the band. The dotted line in both figures show the Hokkaido species and the plain line the species of the main island.

4. PAPILIO JUTANUS. *Fenton*.

This species occurs not only in Hokkaido, but also in the mountains of the main island. Its ally, *P. Dehaani*, Felder, is common round Tokio and northward (principally), becoming scarcer as we go up in Hokkaido, while *P. Jutanus* becomes more and more numerous, until near Sapporo we entirely lose sight of *P. Dehaani*.

These two species or varieties, as Mr. Fenton doubts, differ from each other both in the form of wings and in their markings. In *P. Jutanus* the outer edges of the primaries are slightly scalloped, (Figs. 13 and 14, 13 showing the male wings and 14 the female). The submarginal band of the green atoms of the primaries is more distinct and narrower; a band of yellow atoms a little beyond the middle of the secondaries below, wholly absent in *P. Dehaani*.

I must add that the majority of the facts in this note were made by Mr. M. A. Fenton, and were handed to me in the year 1878, after our summer's trip to that island, Mr. Fenton giving me the liberty of communicating them at the meeting of the Biological Society at Tokio.

I will not venture to draw any conclusions from these simple observations, but I trust that they may be of interest to the readers of PAPILIO.

VARIATIONS IN JAPANESE LEPIDOPTERA.

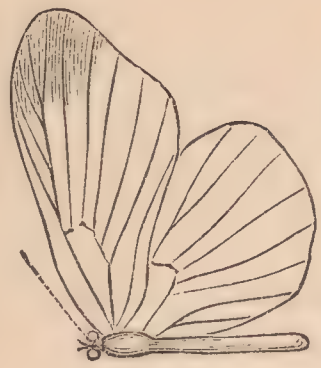

Fig. 1.

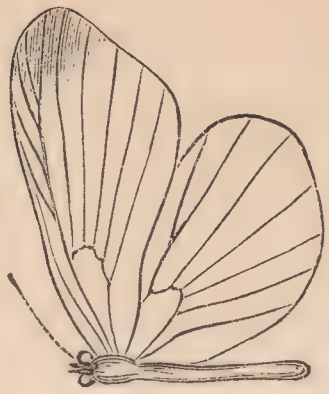

Fig. 2.

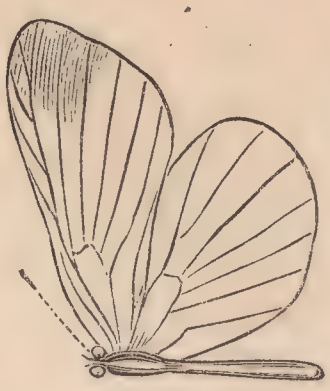

Fig. 3.

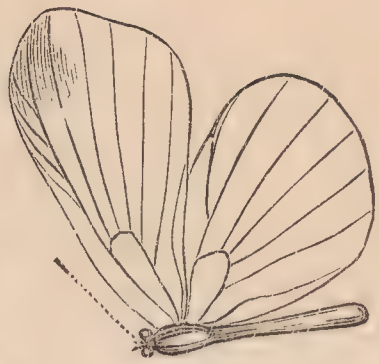

Fig. 4.

Fig. 5.

Fig. 6.

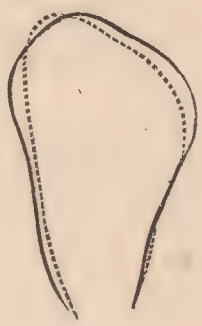

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

NOTES ON ADELOCEPHALA BICOLOR, HARRIS.

By H. S. Jewett, M. D., Dayton, O.

In the following description, the *dorsal line* is the line running along the centre of the back. The *stigmatal line* is the line passing through the spiracles. The *sub-dorsal line* is the line mid way between the dorsal and stigmatal lines. The *dorsum* is the space extending on each side of the dorsal line to the sub-dorsal lines. The *sub-dorsal space* is the space between the sub-dorsal and stigmatal lines. The *stigmatal space* is the space between the base of the legs and stigmatal line. The *venter* is the under surface of the larva.

The eggs are smooth, pale-green, oval disks one-twentieth inch in longer, one-twenty-fourth inch in shorter, diameter and one-thirty-second inch thick. As they approach maturity they become biconcave and change to yellowish-brown in color. From thirty-six to forty-eight hours before hatching, a dark brown spot (the head of the larva which lies coiled around the edge of the disk-shaped eggs) becomes visible through the translucent shell.

Eggs deposited May 26 hatched on May 31. Larvæ one-eighth inch long, pale green. Head very dark glossy brown (nearly black); sub-quadrate, bilobed, with a number of minute stiff black hairs scattered over it. Each segment, from the first to eleventh, inclusive, has three (3) conical tubercles on each side of the dorsal line; one on the sub-dorsal line, another just below it, and the third just below the stigmatal line. Each of these tubercles gives rise to a short black hair. The second and third segments, in addition to these tubercles, have (on each side of the dorsal line) two long (one-eighth inch), filiform, many-branched protuberances, each terminating in a minute pear-shaped knob from which project two short spines. When the larva has just emerged from the egg, these protuberances are brown in the half next to the larva and red in the terminal half; but in a few hours the color changes so that the half next to the larva, the knob and the branches are dark brown, and the remaining portion is red brown. In the fourth to eleventh segments, inclusive, the dorsal line is marked by a fine black line, and the sub-dorsal space is occupied by a colored band consisting of five delicate lines; first a white line just below the sub-dorsal line, next a black line, then a gray line, then a white line and then a black line. The eleventh segment is quite prominent, bearing upon the dorsal line a large, many-branched, dark red-brown protuberance. The twelfth segment has two dorsal and six lateral green tubercles, each giving rise to a short black hair. Legs green, tipped with brown; prolegs green.

Larvæ passed their first moult June 4, devouring their cast-off skins; one-quarter inch long, bright green. Head sub-quadrate, bilobed, brown with a narrow green line on each side, running

from the dorsal line to outer margin of mandibles. Each segment, from first to eleventh, inclusive, has two rows of six tubercles [three on each side of dorsal line, situated as before first moult]. The anterior row of each segment consists of conical yellow tubercles, each emitting a short black hair, while the tubercles of the posterior row are smaller, rounded and white. The protuberances on the second, third and eleventh segments are entirely brown in color, and those on the second and third segments are three-sixteenths inch in length, but otherwise unchanged. The twelfth segment is now much flattened above, triangular in shape and studded with small white tubercles. The stigmatal line, from the fourth segment to anus, is occupied by a delicate black line bordered above by a narrow, and below by a broad white line. Legs and prolegs green, tipped with brown.

Larvæ moulted the second time on June 8; one-half to five-eighths inch long, nearly cylindrical, bright green. Head as large as any other segment, green, sub-quadrate, bilobed, with a white line running from the top of the sulcus between the lobes to the outer margin of the brown mandibles, giving the casual observer the impression that the head is small and triangular, with the mandibles for the base of the triangle. Head covered with minute hairs. First segment as before moulting. The protuberances on second and third segments are one-quarter inch long, of a pink color, with the branches tipped with black, and terminal knob carmine-red. The tubercles on the second to eleventh segments, inclusive, are exactly as in first moult, except that the tubercles of the anterior row of each segment, situated on and just below the sub-dorsal line, are now ivory-white and, on the fifth, seventh, ninth and tenth segments are prolonged and horn-shaped. The protuberance on the eleventh segment is now pink, with white spines tipped with black. The twelfth segment is flattened above, triangular in shape, with the anal extremity slightly bifid, and the sides make an acute angle with the venter, the sub-stigmatal row of tubercles projecting so that the anal prolegs are entirely concealed from above. The whole flattened surface is studded with small green tubercles. The stigmatal line is marked by a band of colors, composed of a fine red line, bordered above by a narrow bluish line, and below by a white line, below which is a bright yellow line. Legs and prolegs green, tipped with brown.

Larvæ passed their third moult June 13th, three-quarters to seven-eighths of an inch long, nearly cylindrical, green. Head green, bilobed, minutely pubescent. Mandibles, brown, covered with minute hairs. First segment at first as in last moult, but towards the end of this moult it becomes very prominent and sub-triangular in shape, with a yellowish-white line on each side of anterior border, running from near the dorsal to the stigmatal line. The protuberances on the second and third segments have

now lost the knobs at their extremities and are brown in some larvæ and green in others. The only other changes are that the horn-shaped tubercles on the fifth to tenth segments are now larger and more prolonged, and are pink on the inside and have the appearance of burnished silver externally, and the stigmatal line is occupied by a marked band of color, consisting of a dark carmine line (passing through the inconspicuous green stigmata) bordered above by a narrow pale blue, and below by a white line. The legs of some larvæ are green and of others brown. Prolegs of some, green, and in others green tipped with brown. In some larvæ the stigmatal space has numerous small black tubercles on each segment; in others there are no black tubercles.

Larvæ passed their fourth moult on June 17th. Length, 1¼ to 1½ inch. Nearly cylindrical, green. Head green, subquadrate, bilobed, covered with minute green granulations, as is also the whole of the body. The dorsum, subdorsal and stigmatal spaces of all the segments are thickly sprinkled with minute white tubercles, while in the stigmatal space there are many minute black tubercles scattered among the white ones. The protuberance on the second and third segments are now one-eighth to three-sixteenths of an inch long, slightly conical, pink, with a number of white tubercles scattered along them, marking the places of the former branches. The "silver horns" on the fifth to the tenth segments are now one-sixteenth to one-eighth of an inch long, bright pink inside and burnished silver externally. The number of these "silver horns" varies in different larvæ, some having them only on the seventh and ninth segments; others have them on the fifth, seventh and ninth segments; still others have them on the fifth, seventh, ninth and tenth segments. I have never found these silver horns on any other segments than those mentioned above, nor have I ever found a larva in which they were wanting, or in which they were present, on only *one* segment.* The stigmatal line is marked by a dark carmine-red line bordered below by a white band. Just below the stigmatal band of colors is a row of prominent black conical tubercles, one to each segment. The protuberance on the eleventh segment is pink with round white tubercles marking the places where the branches were. Legs and pro-legs green.

The larvæ change only in size during the last moult, and are from two to two and one-half inches long when full grown. They began to quit feeding on the 20th of June, entering the ground within a few hours after ceasing to eat. There they pupated within an oval cell lined with a thin cocoon of silk, the first casting its skin on the 24th. The pupa is at first bright green, but changes to jet black in a few hours. Pupa is nearly cylindrical,

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* A larva found by a friend (by bushbeating) in company with *Bicolor* larvæ, having no silver horns, but only the rudiments on *one* segment, but otherwise resembling *Bicolor* larva so closely that he supposed it to be only larval variation, disclosed a ♂ *Anisota bisecta*, Lint.

the anterior extremity being nearly hemispherical and the posterior extremity tapering rapidly in the last two segments to a blunt point which is extended into a bipronged spine three-sixteenths of an inch long. The surface of the hemispherical portion is studded with minute sharp triangular points. Wing cases small, covering only the sides and under surface of the anterior one-third of the pupa. Four of the abdominal segments are separated by a broad, deep sulcus; the anterior and posterior margins of these segments are armed with a row of minute sharp spines.

Imagines began to appear on July 3d, and had nearly all emerged by July 10th.

The insect is three-brooded here, hibernating in pupa. Although the large majority of each brood follows the cycle of development as described, yet a few of each brood are much slower in making their changes. Thus a few of the brood did not complete their growth till the end of July, and three pupæ formed June 26 are still alive (Feb. 28th), having hibernated. Other pupæ of the same brood disclosed their imagines at various periods during July and August. This accounts for the fact that larvæ in all stages of development may be found at any time throughout the summer till frost kills their food plants, which are *Gleditschia triacanthos, L.* (Honey Locust or Three-horned Acacia) and *Gymnocladus Canadensis, Lam.* (Kentucky coffee-tree.)

Up to the third month the larvæ, when alarmed, move the protuberances on the second and third segments as if to frighten away the intruder. The larvæ pupate readily on the bottom of the breeding cage if ground is not furnished them. In this case they build no cocoon.

THE NOCTUIDÆ IN THE MISSOURI ENTOMOLOGICAL REPORTS.

By C. V. Riley, M. A. Ph. D.

To the Editor of "Papilio:"

There are two articles in "Papilio," (Vol. I, No. 8), by Mr. A. R. Grote, to which I beg leave to reply, in the belief that in so doing I may contribute something to Lepidopterology, and charitably overlook reflections unjust and irritating.

In the "Note on *Agrotis repentis*," (p. 126) Mr. Grote again changes his mind as to the synonymy of this species, weakening his previous argument to the effect that it is identical with *A. messoria*, Harris. On p. 77, of Bulletin No. 6, U. S. E. C.,* after repeating the original description of *A. cochranii*, Riley, I remark, "There is little question but that this is the moth briefly characterized by Harris (Ins. Inj. to Veg., p. 444) as *Agrotis messoria*, an examination of the type confirming this view. *A. repentis*, G.

* General Index and Supplement to the nine Reports of the Insects of Missouri, Washington, March 24, 1881.

and R., and *A. lycarum* are also conceded by Grote to be synonyms."

I have on two occasions, by an examination of the types in Harris's collection, satisfied myself that *messoria* and *cochranii* are really identical, and notwithstanding Mr. Grote states that he was unable to find the species in Harris's collection, it must be there, unless destroyed or taken away since 1876. Mr. H. K. Morrison also informs me that it was there in 1874, when he carefully studied and compared it with specimens of *cochranii*. Whether *repentis* is or is not the same, this deponent sayeth not, further than that the figure and description of this last confirms the conclusion that it is.

The readers of "PAPILIO" will doubtless wonder why a copy of Harris's original report should have caused Mr. Grote to change his mind, when the description of *Agrotis messoria* there given is repeated *verbatim* in all subsequent editions.

The little skirmish on the question of the identity of *messoria*, seems, however, but a feint to cover a general criticism of the descriptions of Noctuidæ in the Missouri reports, in which Mr. Grote finds "that most, if not all, of the Noctuidæ there described as new, *were in reality known to science*," and then specifies as follows:

> *Agrotis Cochranii*, Riley, is A. REPENTIS, G. and R.
> *Agrotis Scandens*, Riley, may be A. MESSORIA H.
> *Acronycta Populi*, Riley, is A. LEPUSCULINA G.
> *Prodenia Autumnalis*, Riley, is LAPHYGMA FRUGIPERDA A and S.
> *Xylina Cinerea*, Riley, is X. ANTENNATA, Walk.
> *Plusia Brassicæ*, may be P. NI. HUBN.
> The above are, I believe, all the new Noctuidæ in the Missouri Reports.
> Among the identifications of Noctuidæ in the same Reports, the following are erroneous: *Prodenia Commelinæ*, Riley, is not Abbot and Smith's species, but *Lineatella* of Harvey. (It is possible that *Flavimedia* and *Lineatella* are sexes of one species). Again, the *Agrotis Jaculifera* of Prof. Riley includes *Agrotis Tricosa* of Prof. Lintner and, perhaps, *Agrotis Herilis*, Grote.

By way of comment on the above permit me to call attention to the following facts:

FIRST. That the synonymy there given in September was, so far as it is correct, published in The Bulletin above cited, copies of which were sent early in April to the New York Entomological Club, as well as to several of its members individually.

SECOND. That the species were, in most cases, published as new in the Missouri Reports, upon the determinations of Mr. Grote himself. To be more explicit:

1. Since it is admitted that *repentis* G. and R. is *cochranii*, Riley, and the latter, as I have proved by examination of the types, is *messoria*, Harr., it follows that this last cannot be *scandens*, Riley, which, in fact, bears no resemblance to it, and has always been pronounced a good species by Mr. Grote, both in his published papers and in his correspondence with me. It were

more appropriately compared with *murænula*, Grt. Assuming, however, for the sake of argument, that *messoria* is not *repentis*, then why is *cochranii* made a synonym of *repentis*, since the description of the former was published June 22, 1867, and that of the latter in January, 1868. Mr. Grote could at no time have claimed ignorance of the former description because he wrote me, by date of June 24, 1867, as follows: "I thank you for the *Prairie Farmer*, containing a detailed and interesting account of cut-worms, with your description of *A. Cochranii.* n. sp."

2. *Acronycta populi.* I have accepted Mr. Grote's decision that this is *lepusculina*, Guen., though, as I have pointed out, *populi* differs in several respects from the description of *lepusculina*. See Mo. Rep,, II, p. 121, and General Index, etc.: 6, p. 74.

3. *Prodenia autumnalis.* This was pronounced by Mr. Grote, by letter of August 25, 1869, as "Prodenia sp. new to me," and while I have long since accepted *Laphygma frugiperda*, S. and Abb., as a synonym of one of its varieties, the other varieties would, without the proof to the contrary, which I gave, have undoubtedly been described as distinct.

4. *Xylina cinerea.* This was pronounced different from anything known to Zeller, at the time of the description, and was then, and for several years thereafter, pronounced a good species by Mr. Grote. I discussed its affinities at the time of the description, and the authors of the recent "Check List of Macro-lepidoptera," published by the Brooklyn Entomological Society, express their doubt as to the identity of *cinerea* and *antennata* by retaining the former without number. I have since read Walker's description, and no one could say positively what is meant without seeing the type.

5. *Plusia brassicæ.* This was described as new on the authority of Zeller, as stated at the time. Speyer, as I have shown (General Index, etc., p. 78), proves it to be really distinct, and his careful comparisons will doubtless convince most Lepidopterists.

6. *Prodenia commelinæ.* This was so pronounced by Mr. Grote, from a specimen sent him August 8th, 1867. *Flavimedia* and *lineatella* were characterized by Mr. Harvey, some years later, as I have stated in the "General Index," p. 56. Here again, however, as in the case of *A. subgothica* and its forms we have, I am satisfied, a question of varieties rather than species. With the well known varieties of *Laphygma frugiperda* in mind, I have been particularly interested, for a good many years, in breeding this Prodenia, and I record here my belief, which will be the accepted belief in the future, that *flavimedea* and *lineatella* are one species not distinct from *ornithogalli*, Guen. The larvæ, so far as I have bred material, are extremely variable and not separable, and the same may be said of the mature insects. They are more readily separable from the typical *Commelinæ*, though doubts, even as to their specific distinctness from it are justifiable.

7. *Agrotis jaculifera.* This (Mo. Rep. I, p. 82) neither includes *tricosa* Lintner, nor *herilis* Gr., but, as stated in the "General Index," (p. 56), the true *subgothica*, Haw. Mr. Grote was formerly of this belief, too,* and, it may be of interest to state, in this connection, that upon sending plate I, of my first Mo. Rep. for his opinion of the various species figured thereon, prior to publication, he replied from Danopolis, Ala., by date of March 17, 1869: "No. 11 is *A. subgothica* of which *A. jaculifera* is a synonym." In the "General Index" I have simply stated the fact, without further comment, that, subsequent to the publication of the first Missouri Report, fig 59*a*, had been described as *herilis* by Mr. Grote, and 59*b*, as *tricosa* by Mr. Lintner. It may be as well for me here to record my firm belief that we have to do in this instance with mere variations of one species, and that Guenée and the older authors were wiser in so considering them than the later authors in separating them as distinct species. I fully appreciate the care with which Mr. Lintner has separated the three well marked forms, but with every year that I have been able to get additional material for comparison, I have been more and more convinced of the correctness of the view here expressed, and that between the typical *subgothica* on the one hand, and *herilis* on the other, there is a perfect series, so that it is impossible, in some instances, to refer specimens to any one form more than another.

To sum up, I maintain that Mr. Grote, where he is not actually wrong in his conclusions, or opposed to men whom he himself acknowledges as authorities, simply repeats what I had six months previously published; further, that the present synonym of the species described in the Mo. Reports was *not* known at the time of the descriptions, and that if, as he avers, the species were "known to science," the blame for the synonym falls partly on him who, claiming special knowledge in the family, was not aware of the fact when the moths were referred to him.

Opinions as to the relations of such forms as *Agrotis herilis*,- and *A. tricosa*, *Prodenia lineatella* and *P. flavimedia* will differ according to the conception of what constitutes a species, and there is all the less reason for dogmatism. However I may differ from the describers of those forms as species, I recognize the value of their work in separating the forms and the convenience of designating them by names. "In the field of [science no less than of] thought and literature it is no less our duty to speak and write in such a way that comprehension and knowledge may be increased by our labors without offense being given,"† and, I would add, in such way that practice comport with preaching.

I reserve remarks on Dakruma for another occasion.

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* Bull. Buff. Soc. Nat. S. I., p. 100.

† "The New Infidelity," by A. R. Grote, p. 91.

DESCRIPTION OF NEW SPECIES OF BUTTERFLIES FOUND IN THE UNITED STATES.

By W. H. Edwards.

1. Anthocharis Rosa.
2. Limenitis Hulstii.
3. " Arthemis. aberr. C.
4. Lemonias Duryi.
5. Lycæna Annetta

Anthocharis Rosa.

Male.—Expands 1.2 inch.

Upper side pure white, gray at bases of wings; primaries have a short, straight, black bar on costal margin near apex, turned back obliquely. which, extended, would strike middle of inner margin; another bar on hind margin on upper branch of median; the apical area between these almost immaculate, a few scattered black scales only lying near costa; on arc of cell, a narrow black bar, bent or a little sinuous; costal edge sometimes pure white, immaculate; sometimes with a few black scales and points. Secondaries are of thinner texture, discovering the markings of under side; at outer angle a slight edging of black at the upper branch of sub-costal, and the fringe against this is black; also, there is black fringe at end of the lower branch of same nervure; otherwise all fringes are white.

Under side white, with a pink tint over costa of primaries and all of secondaries above sub-costal nervure, deepest next base; costal edge either immaculate, or with five or six separate black points; the discal and costal bars repeated, reduced, the latter densely covered with yellow scales; the bar on hind margin suppressed, but represented by yellow; the nervules about apex yellow, and on costal edge a black streak at end of each nervule.

Secondaries have three cross bands of black, sprinkled thickly with yellow scales, with some open spaces or spots, discovering a yellow ground; the anterior band narrow, making a circle about base; the second, discal, sends a short, stout branch along median nervure to third, then narrows and is attenuated to a point at inner margin; the third, starting on inner margin, is broad, and after the junction with second, narrows greatly, then widens and strikes hind margin in a triple fork; at outer angle a short, narrow bar similar to the bands; the nervures and branches on middle of the wing yellow.

Body black; the thorax covered with long gray hairs; beneath, thorax yellow, abdomen white along venter; legs pinkish, the femora covered with long white hairs; palpi white with much gray; antennæ white above, yellowish below; club white above, yellow below and at tip.

Female.—Expands 1.4 inch.

Color of male, on both surfaces, similarly marked; a few black scales are scattered between the ends of the apical bars, suggesting a cross band.

From six examples, 3 ♂ 3 ♀, taken by the late Mr. J. Boll, in western Texas, March, 1878. Mr. Boll informed me, in answer to my inquiry, that he took many more, and all were of the type sent me. The species is nearest *Olympia*, Edw., and the banding of under side is of same character. It differs from that species by the immaculate apex, and by the presence of the straight, oblique costal bar, instead of an irregular patch.

LIMENITIS HULSTII.

Male.—Expands 2.75 inches.

Apical area of primaries and all secondaries one shade, pale red-fulvous, the remainder of primaries darker, and deepening gradually from inner margin to cell and costa, where the color is castaneous; costal edge of primaries brown, inner margin reddish-brown; hind margin broadly bordered with black, within the inner edge of which is a row of crescent white spots, or near costa rounded; beyond cell are four sub-triangular small white spots, one in the middle of each interspace, the two upper ones on narrow, dark fulvous ground, the others merely edged with this color; a white spot at origin of upper sub-costal interspace; in cell, next sub-costal, three-fourths the distance from base to arc, a white point surrounded by black scales. Secondaries have a broad black marginal border, through which runs a series of white points; across disk a macular black line, broken at the nervules, widening next costa, each spot edged on the inner side by white; the nervures and branches of both wings black, but not edged with black; fringes alternately black and white.

Under side of secondaries and of apex of primaries light orange-fulvous, clouded, whitish along the nervules; the remainder of primaries much as above; castaneous next base in cell; the black border crenated on inner side on both wings, the spots in same repeated, but now large crescents; between these and the margins another row of narrow whitish crescents; the spots on primaries repeated, enlarged, edged on outer side by deep brown, and a patch of same brown lies in lower median interspace, in line; a second spot in cell near base and next subcostal; costa brown; on secondaries the black line is continuous, heavier, edged by white on inner side; the nervures of both wings black, without any edging of black scales.

Body above covered with fulvous hairs, below black on thorax with white spots on sides; abdomen with a buff lateral band and another on venter, between them a black stripe; legs black, the first pair white in front; palpi black, in front white, (antennæ in example under view wanting).

From a single male taken in Utah and sent me by Rev. Geo.

D. Hulst, of Brooklyn, N. Y., to whom I take pleasure in dedicating the species.

This species differs from *Disippus* in the pale color of upper surface (resembling Danais *Strigosa*, Bates), and in the contrast of color between the basal area of primaries, which is castaneous, and the apex, as also all of secondaries, which are pale colored of one shade; in the brown costal margin, and absence of the black patch and stripe beyond cell, which is a conspicuous feature of *Disippus*; in the presence of four white spots, triangular instead of rounded, of equal size instead of irregular; in the macular stripe on secondaries and its white edging, and in the absence of black scales to the nervures and branches. It is unlike anything I know. For two years I have kept this example without describing, hoping that others might come in, especially in Arizona collections.

LIMENITIS ARTHEMIS. aberr. C.

Upper side fulvous, obsured on primaries by much black, on secondaries but little; on the former, fulvous is most distinct in middle of cell, and below cell to inner margin; inside the marginal border a row of large dull fulvous spots, lying on the two discoidal and upper median interspaces; white spots beyond cell as in *Disippus*; a white dash on inner margin corresponding to what would be the white band in *Arthemis*; secondaries have a complete sub-marginal row of bright fulvous spots, and on the black area next over these, a narrow white band, of even width throughout, cut into spots by the black nervules.

On under side the fulvous is less obscured on primaries, and in cell next base is a large orange patch, and a broad bar across arc; the sub-marginal spots are continued to costa, and are mostly whitish on basal side. Secondaries have the fulvous spots and white band; the whole disk and area to base pale orange-fulvous with patches of orange disposed as in *Arthemis*, but of larger size.

This singular example seems to me to be a hybrid between *Disippus* and *Arthemis*. The color is of *Disippus*, so are the extradiscal white spots on primaries; but the sub-marginal spots of both wings are of *Arthemis*; the white band (*Arthemis*) is only found on secondaries and is very narrow, but there is a trace of the band of primaries on inner margin; the under side is of *Disippus*, but of primaries it is a mixture; the orange patches on both wings about bases are of *Arthemis*, but enlarged. This example was taken in Canada, and sent me for inspection by Mr. H. H. Lyman. I call this aberr. C., applying A and B. to the aberrations described (A. figured) on *Arthemis* plate, in Bt. N. A., Vol. 2., Plate 1, *Limenitis*.

LEMONIAS DURYI.

Male.—Expands .9 inch.

Whole upper surface orange-fulvous, except a narrow border of fuscous to hind margins; within this border a series of white

dashes, one to each interspace, in the middle of each dash a black dot, and another at anterior end; across the disks a common row of black spots, small, mostly lunular; the row on primaries zig-zag; on secondaries a double curve; on primaries several of these spots have white spots behind them, especially the three or four on costal margin, and the one in second median interspace; each wing has a white spot at end of cell, edged on either side by a black bar, and some black dots nearer base.

Under side of primaries light orange from base to margin, the border of hind margins ashy-brown; the dashes and spots repeated. Secondaries ashy-brown from base to margin; the marginal dashes and dots repeated, enlarged; across disk a row of fine white spots, the first and third from costa minute, the third small, the second large, oval, the fifth a patch on inner margin, all edged anteriorly by black; above these a row of three, the middle one of which corresponds to the cellular spots of upper side, and is edged on both sides by black; the other two on the anterior side only; three small white spots next base; fringes alternately white and pale fuscous.

Female.—Expands 1.1 inch.

Upper side colored as the male, being wholly orange-fulvous, except the borders. Under side as in male.

From 1 ♂ 1 ♀ taken by Mr. C. Dury in New Mexico, about five miles east of Mesilla, in some foot-hills of the Organ Mts., in 1881, about April 20. Size of *Mormo* and the general arrangement of the spots is as in that species, but the color is fulvous, whereas *Mormo* is fulvous on disk of primaries only, and not at all on secondaries. Mr. Dury writes that the species was rather abundant, and several examples were taken. It flew rapidly near the ground, alighting frequently.

LYCÆNA ANNETTA, *Mead.* Mss.

Male.—Expands 1.25 inch.

Upper side primaries blue; costal margin of primaries silvery next base; fringes white.

Under side white, with a faint blue tint; both wings have a marginal series of small fuscous spots, preceded by lunules, and behind the latter, on secondaries, yellow-fulvous; a little of this on primaries; on secondaries the three or four spots next inner angle are partly covered by pale blue metallic scales; on the arc of cell of each wing a fuscous bar.

Female.—Expands 1.05 inch.

Upper side pale or whitey brown, nearly white next the hind margins, with a blue shade over the posterior half of each wing and at base; primaries have a narrow fuscous border to this margin, and secondaries a black line; the cellular mark on primaries quite distinct, owing to the delicate texture of the wing; secondaries have a marginal series of round black spots, and the

lunules of under side are repeated somewhat, together with the yellow patches.

Under side pale fawn-color over most of the surface, becoming white on the extra-discal areas; the markings as in the male, but more distinct, especially on primaries; in addition there is an extra-discal transverse row of fuscous dots on each wing.

From 1 ♂ 1 ♀ taken by Mr. T. L. Mead, near Salt Lake, Utah, in 1878. Several other examples were taken at same time. The species is close to *Anna*, Edw., but is of scarcely more than half the size (in superficial area). The male is color of *Anna*; the female quite different, *Anna* being dead-leaf brown, with a submarginal series of large fulvous crenations on each wing. In both sexes of *Anna* is a common transverse row of spots; elongated spots mostly on primaries; rounded on secondaries; in *Annetta* the series is wholly composed of mere dots, and is altogether wanting in the female under view.

NOTES ON LEPIDOPTERA.

HONEY FOR SUGARING.—I want to suggest to the members of your Club to try extracted honey in sugaring for Lepidoptera. It must be pure and free from glucose, and can be obtained in solid candied form from L. C. Root, Mohawk, N. Y. I should not dilute it much (if any), but only liquify it. It will, I think, prove very attractive.—F. C. BOWDITCH, Boston.

ARCTIA DIONE.—On July 8, 1881, I obtained a ♀, which gave 320 eggs. Half of these were lost or given to friends, but 63 went to chrysalis, and 28 hibernated as apparently full grown caterpillars. In due time 51 emerged as perfect moths, presenting very great variation in the markings. The eggs were placed close together in one patch, and in regular rows. Food plants, *Plantago* and *Polygonum*. Mr. R. Bunker, of this city, is rearing some Dione from eggs laid by my brood, and they hibernate as half grown caterpillars.—H. ROY GILBERT, Rochester, N. Y.

SYNOPSIS OF THE NOCTUIDÆ.—Mr. J. C. Smith is publishing in The Bulletin, Brooklyn Entm. Soc., a careful revision of this difficult group. It will, doubtless, be of great va ue to students.—EDITOR.

RARE NOCTUIDS.—The following species were taken at Centre, N. Y., during the past year.

Leptina Doubledayi	Guen.		♀	August.
Hadena fractilinea	Grote.	♂	♀	August.
Agrotis dilucida	Morr.		♂	September.
" janualis	Grote.		2 ♀	September.
" perpolita	Morr.		♀	September.
Scopelosoma tristisignata	Grote.	1 ♂	2 ♀	
" Morrisonii	Grote.	2 ♂	1 ♀	
" vinulenta	Grote.	4 ♂	2 ♀	
Glaea viatica	Grote.		♀	October.
Xylina semiusta	Grote.		♂	October.
" unimoda	Lintn.		♀	October.
" lepida	Lintn.	2 ♂	3 ♀	October.

The results of the past season have been, on the whole, remarkably poor. Where hundreds of examples came formerly to sugar, but few scattering ones were observed. W. H. HILL, Albany, N. Y.

MELITTIA CUCURBITÆ.—*Haw.* From numerous observations, I am assured that this insect hibernates in the caterpillar stage, and does not transform to the pupa state until the spring. The pupa cases are formed in the latter part of the summer, and, in every instance thus far, I have found the larvæ in the cases unchanged. The last examination was made only a day or two since. —N. COLEMAN, Berlin, Conn., February 24, 1882.

BOMBYCIDÆ OF N. AMERICA.—The readers of "PAPILIO" will be glad to learn that Mr. R. H. STRETCH is about to issue a volume, illustrating the whole of the known species of N. American Bombycidæ and Zygænidæ. It will contain about twenty plates, which will be lithographed in black and white only, from pen and ink drawings. The price will not exceed $2.50 for the whole work. We shall refer to the subject again, when the work is nearer completion.—EDITOR.

PARNASSIUS SMINTHEUS IN CALIFORNIA.—It has seemed somewhat strange that this species should have been so long unobserved in California, when its yellow spotted form (P. Behrii.) is comparatively common on the slopes of the Sierra Nevada. In June last, however, I observed the true Smintheus rather abundant in moist spots in the Shasta district, and later, that is in August, I saw considerable numbers in the wooded sides of the mountains near Castle Lake. I took one magnificent example, with very large red spots, at first sight looking like Par. Nomion. It was flying on the top of Mt. Bradley, about 7500 feet above the sea level, and seemed attracted to the flowers of a species of Sedum.—JAMES BEHRENS, San Francisco.

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FEMORAL TUFTS OR PENCILS OF HAIR IN CERTAIN CATOCALÆ.

By James S. Bailey, A. M., M. D.

The accompanying cut represents the fan-shaped brushes of hair found upon the *pedes medii* of certain *Catocalæ*. They are inserted in or near the trochanters, and lie concealed within the folds of and close to the spines of the femora, and reach nearly their entire length. The tufts are capable of being elevated at will, as seen in the engraving, and of being completely hidden when desired. When extended they open like a fan, and resemble an artist's fitch brush. The outer border has the appearance of having been evenly trimmed with scissors. During the season of 1881, at Center, N. Y., *Catocala concumbens* was quite numerous at sugar. In spreading, in some of the examples a single tuft was visible, but in no instance were both pencils seen at the same time in an individual without lifting one of them out with the point of an entomological pin. This was accomplished by passing the point through the scales, and very close to the trochanters, when the tufts were easily lifted from their resting places and exposed to view, which gave the

Catocala a novel appearance. One of them was allowed to remain unspread for illustration and cabinet use. Afterward, in examining other varieties of *Catocalæ*, similar phenomena were exhibited, but were only found in the male sex. Not being readily impressed with the importance of the discovery, I did not pursue my investigations through the different species captured during the season. Later I placed on damp sand for relaxation other *Catocalæ*, to see if they contained the same appendages, but I failed to detect them by the most careful manipulation. The result might have been different while the examples were fresh. Another year I propose to learn, if possible, if they are common in all species; if not, in which they are found.

Since the discovery I have been visited by a number of entomologists, who have examined the femoral tufts, but not one of them could explain the design and use of them, therefore the subject is brought to the notice of the readers of "PAPILIO" with the hope that some one can offer a satisfactory explanation.

To one having noticed the overtures of a male beetle in addressing his mate; having witnessed the gentle contact of his antennæ with hers, oft repeated, besides other demonstrations of an endearing nature, I think it may not be improbable to suppose that these tufts may be employed as an aphrodisiac. If for other purposes, I should be pleased to know them.

NOTES ON N. AMERICAN ÆGERIDÆ, WITH DESCRIPTIONS OF NEW FORMS.

BY HENRY EDWARDS.

BEMBECIA MARGINATA.

Trochilium Marginatum. Harris.

This appears to be one of the most common species of the whole group. It has been taken in abundance near Washington by Mr. H. Schonbörn, and again on Long Island by the Rev. G. D. Hulst, the latter gentleman having in print some most interesting observations upon its habits. It is undoubtedly referable to the genus *Bembecia*, and bears in many respects a striking resemblance to the European *Bembecia hylæiformis*. Our species has been re-described by Prof. Riley as *Troch. rubi*, and by Mr Hulst as *Sesia flavipes*. The synonomy should stand thus:

Bembecia (*Trochilium marginatum*) *Marginata. Harris.*
Trochilium Rubi. Riley.
Sesia Flavipes. Hulst. Bull. Brooklyn Ent. Soc.

TROCHILIUM CAUDATUM. *Harris.*

A ♂ in the collection of Prof. C. V. Riley has the transparent space of forewings exceedingly small, consisting only of two longitudinal streaks along the sides of the median nervule. The antennæ are bright orange. This singular species should form the type of a new genus, for which I propose the name of ALCATHOE. It may be readily separated by the caudal appendage of the ♂, which is as long as the abdomen, the forewings of this sex being partly transparent, while those of the ♀ are wholly opaque, resembling the genus *Sciapteron.* The hind tibiæ are furnished with a large bunch of hairs as in Melittia.

TROCHILIUM SYRINGÆ. *Harris.*

This species has been re-described by Herr Moschler in Stett. Entom. Zeitung, 1876, p. 311, as *Grotea longipes.* Herr Moschler writes me that it certainly forms the type of a distinct genus, and that he has elsewhere referred it to *Podosesia.*

TROCHILIUM TIBIALE. *Harris.*

♀. In this sex, which appears to have been unknown to Harris, the antennæ are without pectinations, and are much thickened towards their apical half. The bands of the abdomen are narrower, only covering half the segments in 3, 5, 6, 7. In all other respects it resembles the ♂. Montreal, Canada, Mr. G. J. Bowles.

Exp. wings, 35 mm. Length of body, 20 mm.

MELITTIA SNOWII. n. s.

Allied to *M. cucurbitæ*, Harris, but smaller, and singularly unlike in color. Head above, thorax, base of abdomen and upper side of forewings, pale fawn drab. Palpi, collar, pectus, fore coxæ and outer edge of tibiæ sordid white. Antennæ dull brown. Dorsal portion of abdomen dull brown, sides dirty orange, and lower portion sordid white. The hairs on the hind tibiæ are black inwardly, with a few bluish scales. Hind tarsi clear white. Abdominal margin of hind wings dull testaceous. Fringes of both, fawn drab. Beneath, the forewings are dull yellowish, darker at posterior margin. Hind wings with the abdominal margin of a brighter yellow shade than above.

Exp. wings, 22 mm. Length of body, 12 mm.

2 ♂, Kansas, Prof. Snow, to whom I regardfully dedicate this very interesting species.

MELITTIA AMŒNA. n. sp.

Head black in front, with a few bluish scales. Palpi above orange, beneath white, terminal joint black within. Eyes dull orange, with the orbits clear white. Antennæ bluish black. Thorax dull bronze black, with the collar pale dull greenish, and

the long hairs on the sides sordid white, with dull greenish reflection. Abdomen black, with purplish reflection; posterior edges of the segments narrowly greenish white. Caudal tuft orange-brown, with black hairs. Bands on the lower side of abdomen a little wider than above. Fore coxæ black, with orange scales. Middle and hind coxæ black, edged with whitish. Fore and middle tibiæ rich orange exteriorly; black within. Bunch of hairs on hind tibiæ rich orange, with a few white scales intermixed; black within. All the tarsi are black. Fore wings purplish black, covered with bright metallic green scales, less visible below. Fringes of both wings, brownish-black.

Exp. wings, 27 mm. Length of body, 16 mm.

1 ♂, Douglas Co., Kansas, 900 feet, Prof. Snow.

SCIAPTERON ADMIRANDUS. n. sp.

Head with orange hairs between the eyes, the orbits of which are white. Palpi orange, antennæ chestnut-brown. Thorax dull brown, with narrow lemon-yellow streaks at base and on the sides, below the base of the wings. In front of the junction of the wings is a deep orange patch. Collar and a broad patch behind it lemon-yellow. Abdomen with two basal segments brownish-black; 3d, bright lemon-yellow; 4th, deep orange; 5th, lemon-yellow; 6th, 7th and 8th, deep orange, edged posteriorly with lemon yellow. The posterior edges of 3d, 4th and 5th are purplish-black. The same colors extend beneath the abdomen. Caudal tuft, dull brown. Legs wholly deep orange. Forewings brown, with golden reflection; at their base a bright lemon-yellow spot. Hind wings with posterior margin of brown scales, which also extend along the median nervule to the posterior extremity of cell. Base and abdominal margin, rich deep orange. The vitreous disc is very opalescent. Fringes coppery brown. Beneath, the forewings have the base bright lemon-yellow, and the abdominal margins of the hind wings are bright orange.

Exp. wings, 32 mm. Length of body, 18 mm.

1 ♂, Texas (J. Boll). Kindly added to my collection by my friend, Mr. O. Meske, of Albany.

HARMONIA. n. genus.

Head free, as wide at base as at thorax. Palpi very long, sparsely clothed with hairs, terminal article twice the length of the rest. Antennæ slightly thickened towards the apex, with double row of very fine serrations. Thorax with long hairs at the sides. Abdomen long, narrow, the four posterior segments with lateral, broadly-spreading, fan-shaped scales. Caudal tuft unusually long and broad, divided in the centre and spreading. Fore tibiæ flattened, with the hairs very long beneath. Hind tibiæ also very long, reaching beyond the abdomen, and densely clothed with hairs. Forewings opaque. Hind wings vitreous, with large discal mark at the end of cell. In addition to the present species, this genus includes *Ægeria pini.* Kellicott.

HARMONIA MORRISONI. n. sp.

Head and thorax deep black, the latter with some pale yellow scales thinly scattered above and below. Palpi pale yellow at base, black towards terminal half. Antennæ bluish black at base and apical fourth; the middle straw color, wholly orange-brown beneath. Abdomen and caudal tuft wholly bluish-black above and below. Legs wholly bluish-black, except the tibiæ, which are pale straw color. Forewings golden-brown with purplish gloss, lightest toward posterior margin. Discal mark bright orange. Fringes of both wings bright golden-brown. Beneath the margins and base of forewings are straw color, discal mark as on upper side. The discal streak of hind wings is also edged with orange. 1 ♂, Montana Terr. Mr. H. K. Morrison, to whom I have much pleasure in dedicating the species.

Exp. wings 24 mm. Length of body, 18 mm.

Type. Coll. Hy. Edwards.

ALBUNA DENOTATA. n. sp.

♂. Head black, with straw-colored line at base. Orbits of eyes, clear white. Antennæ brown above, bright orange beneath. Palpi black, straw color in front and at the tip. Thorax black, with double pale yellow spot at the sides. Abdomen black, with 3d, 5th, 7th and 8th segments rather broadly banded with straw yellow, the band continued beneath. Caudal tuft narrow and pointed (as in all the genus), black, with few yellow hairs. Thorax beneath with pale yellow spots at the base of the legs and of the wings. Coxæ and femora wholly black, with bluish reflection. Tibiæ and tarsi bright orange, with a few black hairs sprinkled over the latter. The forewings, with the exception of a vitreous streak above median nervule, are covered with golden-brown scales. Internal margin fiery red, with a bright pale yellow spot on the extreme base. Discal mark obscured. Hind wings vitreous, with discal mark bright coppery brown. Beneath both wings are golden-streaked; discal mark of superior pair distinct, bright orange.

Exp. wings, 26 mm.

♀. Same as ♂, with the antennæ simple, and the vitreous streak of forewings less apparent.

1 ♂ 2 ♀. Montana Terr. H. K. Morrison.

Types. Coll. Hy. Edwards.

ÆGERIA EXITIOSA. n. var. FITCHII.

I apply this name to the form of the ♀, in which the 4th segment of the abdomen only is deep orange, and in which "the space between the two inner veins of the hind wings is nearly, or quite, covered with blue-black scales, forming a stripe which divides the transparent disc into two parts." Fitch, Noxious Insects, Pt. 1, page 116.

In roots of wild cherry. Tallahassee, Florida. (A. Koebele.) W. Virginia. (T. L. Mead.)

ÆGERIA TECTA. n. sp.

Head jet black, with some white scales at the base of the eyes and between the antennæ. Palpi very pale yellow, with the last article black. Antennæ blue black above, castaneous beneath. Thorax with narrow buff lines on sides and at base. Abdomen with narrow buff band on basal segment, a wider on the 2d, none on the 3d or 5th, a very wide one on 4th, and narrow on 6th and 7th. These bands are repeated on the under side. Caudal tuft, bluish-black above, with some pale buff hairs beneath. Fore-wings with costal and posterior margins, bronze black, internal margin very pale yellow for its basal two-thirds. The discal mark is bronze brown, with the posterior edge orange. The transparent space between the cell is very large, much larger than in *Æg. tipuliformis*, and allied species, thus leaving the posterior margin very narrow. The margins of secondaries are also very narrow, that of the costa being very pale yellow. On the under side of forewings is a bright purplish reflection, not visible above, the margins and nervures being all pale yellow, except on posterior margins, where they are bronze black. Hind wings as on upper side. The legs are blue black, banded with very pale yellow. 2 ♂. Prescott, Arizona. J. Doll.

Exp. wings 16 mm.

Types, Coll. B. Neumoegen.

ÆGERIA HENSHAWII. n. sp.

Closely allied to *Æg. fulvipes*, Harris, of which it may be an extreme variety. It differs, however, from that species, in the following particulars: The abdomen is wholly black; the base of the fore wings has a fiery red spot, the discal mark is edged posteriorly with fiery red, and beneath, the costal margin for its apical half, and the margins of the discal mark are of the same color. In other respects it is the same as *Æg. fulvipes*.

Exp. wings, 22 mm.

1 ♀. Mingan Island, Labrador, Mr. S. H. Henshaw, who has kindly aided my labors in this difficult group, and to whom I dedicate this pretty species.

ÆGERIA ASILIFORMIS. Rott.

Specimens of this species, exactly agreeing with European examples, have been taken at Walpole, Mass., by Miss C. Guild; at Winchester, Mass., by Mr. R. Thaxter, and at Cambridge, Mass., by Mr. P. R. Uhler. These are preserved in the collection of the Boston Soc. Nat. History (Nos. 1341, 1342).

ÆGERIA TIPULIFORMIS. L.

In some specimens from Ohio, the vitreous spaces are somewhat larger than in the European form, the color is more intense black, the caudal tuft beneath has a larger proportion of yellow, and the insect has generally a more delicate appearance. These may prove to belong to a distinct species.

ÆGERIA QUINQUECAUDATA. Ridings.

♀. The type of this species was a ♂. I think the present is the first descriptive notice of the other sex. The forewings are greenish black, with metallic reflection, purplish at the posterior margin. Hind wings dull black, opaque, except at the base, which is more or less transparent. Fringes of both wings brown black. Under side of wings wholly purplish black, nervules with a greenish shade. Antennæ and head dull black. Thorax greenish black, with the tegulæ deep orange in front. Abdomen steel black, with the 4th segment wholly deep orange. The "tails," so characteristic of the ♂, are are wanting in this sex. The palpi are deep orange below, bluish above. Legs and under side wholly greenish black.

Exp. wings 26 mm.

2 ♀. Georgia. H. K. Morrison.

Types. Coll. E. L. Graef. F. Tepper.

This singular form is certainly not congeneric with *Ægeria acerni*, *Æ. pyri*, etc., the abdominal appendages of the ♂, and the opacity of the forewings serving to distinguish it. I propose for it the generic name of SOSPITA.

THE LIFE-HISTORY OF EUSTROTIA CARNEOLA, GUENEE.

By D. W. Coquillett.

EGG.—Button-shaped, grooved vertically, pale yellowish white; in the centre of the upper side is a reddish dot, and a short distance outside of this is a reddish circle; transverse diameter about ⅓ mm.

LARVA.—*First stage.*—Body green, marked with a subdorsal white line and a stigmatal white stripe; piliferous spots obsolete; head and venter green, unmarked; sixteen legs;* length 10 mm.

Second stage.—Same as in the first, except that there is a white dorsal line and the piliferous spots are white; length 13 mm.

Third and last stage.—Body green, sometimes tinged with pink; sutures of the segments sometimes yellow or brown; a white dorsal line usually edged with black; a white subdorsal line and a white stigmatal stripe; subdorsal surface sometimes tinged with black or purple; spiracles white, ringed with brown or black; head and venter green, unmarked; length 19 mm.

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*Dr. Packard, in his "Guide to the Study of Insects" (p. 316), erroneously says that the larvæ of *Erastria* (*Eustrotia*) have only three pairs of abdominal legs.

CHRYSALIS.—Of the usual shape, polished yellowish brown; posterior end quite robust, terminates in two short hooks; length 9 mm.

The lighter colored larvæ closely resemble those of *Telesilla cinereola*, Guenee, which I have bred from ragweed (*Ambrosia artemisiæfolia*), and from burdock (*Lappa officinalis*). The last named larvæ never have the body tinged with black or purple, and the dorsal space is tinged more or less with white. But the greatest difference between these two larvæ is in the markings on the head; for while in *carneola* the head is unmarked, in *cinereola* it is marked with an inverted v-shaped white mark on the face, and a white dash on each side. The larva of *Hypena scabra*, Fabricius, which feeds upon clover, closely resembles that of *carneola*, but is readily distinguished from it by having only three pairs of abdominal legs, *carneola* having four pairs.

The food plants of this species are yellow dock (*Rumex*), smartweed (*Polygonum pensylvanicum*), and probably golden-rod (*Solidago*). I have bred the moths from larvæ found feeding upon the two first mentioned plants, and have found upon a golden-rod a larva not differing very much from the above.

The eggs are deposited either singly or in clusters of from two to four, and in midsummer hatch out in about four days. When jarred from their perch the young larvæ hang suspended by a silken thread. When fully grown, they enter the earth and each one forms an oval cavity, in which it spins a thin cocoon. The length of time which they spend in their different stages varies, but is about as follows: First stage, 10 days; second stage, 2 days; third stage, to entering the earth, 4 days; entering the earth to imago, 12 to 16 days—completing the cycle from egg to imago in about five weeks.

Two broods are produced in one season, the imagos of the first brood appearing during the month of July and early in August, those of the second brood passing the winter in the chrysalis state and issuing throughout the month of May of the following year.

FOOD PLANTS OF TELEA POLYPHEMUS IN THE COUNTY OF YORK, ONTARIO.

[From a paper read before the Natural History Society of Toronto, by W. BRODIE.]

Riley, in his Missouri report for 1871, gives a list of 19 food plants; 10 of these, although found here, are not on my list. These 10, with my list, give a total of 49 species.

ORDER, TILIACEÆ.

Tilia Americana... ....Linn.
Tilia Europæa ....Linn.

ORDER, ROSACEÆ.

Crataegus coccinea.. ....Linn.
" *tomentosa*..... .....Linn.
" *crux-galli*..... .....Linn.
Amelanchier Canadensis.....Torr & Gray.

ORDER, GROSSULACEÆ.

Ribes cynobati.....Linn.

ORDER, HAMAMELIDACEÆ.

Hamamelis Virginica..... ....Linn

ORDER, CUPULIFERÆ.

Quercus alba..... .....Linn.
" macrocarpa ....Michx.
" rubra.....Linn.
Corylus Americana..... .....Walt.
Corylus rostrata..... .....Ait.
Fagus ferruginea..... .....Ait.
Carpinus Americana..... .....Michx.
Ostrya Virginica ....Willd.

ORDER, JUGLANDACEÆ.

Carya tomentosa..... ....Nutt.
" amara ....Nutt.
" alba . ...Nutt.

ORDER, BETULACEÆ.

Betula lenta..... ....Linn.
" excelsa..... .....Linn.
" alba..... Spach.
" papyracea.....Ait.
Alnus incana ....Willd.
" serrulata .....Ait.

ORDER, SALICACEÆ.

Salix alba..... .....Linn.
" humilis ....Marshal.
Populus grandidentata..... .....Michx.
" tremuloides ....Michx.

Cocoons constructed on thorn trees usually hang during the winter; the petioles being short, several strands of silk are firmly attached to the twigs. In a few cases I have noticed the twig and petioles coated with silk approaching the habit of *C. promethea.*

Cocoons spun by larvæ, fed on basswood, oak or birch, are usually large and the silk of superior quality.

In long and warm seasons about 50 per cent. are double-brooded, but this is against the increase of the species, as cold weather usually sets in before the larvæ are fully matured.

DESCRIPTION OF A NEW HYPERCHIRIA FROM ARIZONA.

By B. Neumoegen.

Hyperchiria Pamina. n. sp.

♂. Antennæ dark luteous. Head and thorax light olive color. Patagiæ with light yellow tuft at the end. Primaries falcate, light olive, somewhat darker at base, but lighter along exterior margin. An irregular, transverse yellowish line, with anterior brownish border from very near apex to the centre of interior margin. An irregular square discal blotch of olive color, with dark dots at the intersection of nerves. A white testaceous lateral line at thorax, between the base of costa and base of interior margin.

Secondaries very light olive color. The ocellus blackish blue with white centre, sprinkled with bluish dust. An irregular semi-circular black line, from costa to and partly along abdominal margin, enclosing the ocellus. The field enclosed by this line, of bright, light yellow color, somewhat fading towards base. In the space between this line and exterior margin, and running parallel to both, a purplish, rose-colored, irregular band terminating very near anal curve. A conspicuous, bright rose-colored tuft from base, along abdominal margin, fading toward the centre and anal curve. Abdomen fawn drab, with bright rose-colored segmentary bands.

Beneath, primaries and secondaries fawn drab. The transverse line of primaries of purplish rose tint, the interspace between this line and base being likewise of a lighter purplish rose, fading towards costa. Discal spot conspicuous, black with white central dot. A white discal spot on secondaries and indications in purplish rose-color on the same, of the semi-circular line and its parallel band.

♀. Of a lighter olive tinge. The ocellus and its white centre on secondaries more pronounced than in ♂.

Beneath, on secondaries a purplish line, not exactly following the course of the semi-circular line on upper surface, but curving into an undulated line below discal spot, and terminating in the centre of abdominal margin, thus assuming somewhat the shape of an interrogation sign. In other respects agreeing with ♂.

Some of the examples vary from drab fawn to true olive color.

VAR. AUROSEA.

This is a splendid variation of the above described insect, the head, thorax and primaries being of a golden yellow color, with sprinkling of light rose-colored dust; the tuft, along abdominal margin of secondaries, of bright rose-color, and the parallel band between the black semi-circular line and exterior margin of bright purplish red.

Expanse of ♂, 2¾–3 inches; ♀, 3–3⅝ inches.

Length of body of ♂, ¾–⅞ inches; ♀, 1–1⅛ inches.

Habitat, Prescott, Arizona.

Caught and raised by Mr. J. Doll. A description of the larva and it moults will be given in one the ensuing numbers.

This wonderful insect can proudly rank, in regard to beauty, with any of its relations of tropical America.

As Felder, Walker, Westwood and others have described various species of Hyperchiria from Mexico and adjacent countries, I hesitated with the description of H. Pamina, for fear of creating a synonym. I finally applied to the kindness of Mr. H. Strecker, who has extensive working material on hand, and he returned H. Pamina to me as "new."

ON THE EARLY STAGES OF TWO PLUME-MOTHS.

BY D. W. COQUILLETT.

ŒDEMATOPHORUS INQUINATUS, Zeller.—*Larva.*—Body green, sparsely covered with raised white dots; warts concolorous, each bearing from two to six stiff, curved, diverging white bristles of different lengths; spiracles raised, whitish; head partially retractile into segment one, green, tinged with brown and marked on each side with a black spot above the jaws; venter green, unmarked; length 12 mm. Two specimens. Lives on *Ambrosia artemisiæfolia.* One pupated July 27, producing the imago August 3; the other pupated July 30 and the imago emerged August 6.

Chrysalis.—Of the usual shape, pale ash color, marked with a large pink spot near the middle of the upper side; on this spot is large brownish-black spot; length 7 mm. The chrysalis is fastened by its posterior end to the upper side of some object,

from which it stands in a oblique direction, the abdomen being slightly curved.

LIOPTILUS HOMODACTYLUS, Walker.—*Larva.*—Body green; a dorsal white line, and a short distance each side of this is a faint whitish stripe; a broken subdorsal whitish line, and sometimes a similar stigmatal one; warts concolorous, and from each issues a spreading cluster of six or more whitish hairs; segment one projects slightly over the head; head and venter green; length 14 mm. Feeds on *Solidago Missouriensis.* Three specimens; very sluggish. One pupated June 15, producing imago June 28.

Chrysalis.—Of the usual shape, white, tinged in places with green, quite thickly covered with white piliferous spots, each bearing one or two white bristles; length 10 mm. The chrysalis is fastened ventrally to one side of some vertical object.

For the determination of the above species I am indebted to Mr. Chas. Fish.

NOVA SPECIES GENERIS CERATOCAMPA.

By D. H. WEYENBERG, Cordova, Buenos Ayres.

C. VOGLERI. n. sp.

Alae anteriores subfuscæ-subolivaceæ maculis albis ellipticis, in margine externo triangularibus alae posteriores flavæ, speculo centrali sanguineo, fascia nigra ad marginem externum emanans. Collo axillisque sanguineis.

Thorax lineis duabus parallelibus albis ornatis nec non pleuræ linea curva alba; abdomen subfuscum articulationibus sanguineis et linea laterali alba; pedibus subfuscis.

Alarum expansio 9 centim. Corporis longit. 4, 5 centim.—Habitat, Cordova.

CORDOVA, Argent., 1881.

NOTES ON LEPIDOPTERA.

COTTON-WORM MOTH.—The Moth of the Southern "Cotton Worm" (*Aletia argillacea*) has occurred in this county in immense numbers during the past fall. I first met with it September 12

on the shore of Lake Ontario, a few miles west of Charlotte. The bodies of the dead and dying insects formed quite a perceptible ridge along the water line, while among the *débris*, just out of reach of the waves, thousands had crawled and were drying their wings on the sticks and stones; a great many other insects of all orders were also present (apparently overtaken and drowned by a violent storm that occurred the night before), but *Argillacea* outnumbered the whole by more than a hundred to one.

A few days later *Argillacea* appeared in profusion in the orchards and gardens in the district. The insect is said to be injurious to peaches in the South; it is interesting to know that here in the North it still retains its liking for that fruit. I captured thirty-two individuals one evening on four bruised peaches, and I also found it in abundance sucking the juices from ripe pears; hundreds could be shaken from grape vines during the day time; the proprietor of a vineyard in the neighborhood assured me that they severely injured his grape crop by sucking the ripe fruit. I met with it every mild evening until December. Even at this late date their fondness for fruit was indicated, as I found them on rotten apples.—DAVID BRUCE, Brockport, N. Y.

EARLY BUTTERFLIES IN CALIFORNIA.—In a letter recently received from Mr. M. G. WRIGHT, of San Bernardino, California. He says: "The season opened here very finely. On February 5th I took twenty-seven examples of *Lepidoptera;* February 12th, three examples; February 20th, thirty-two examples; March 1st, eighty-three examples; March 5th, fifty-six examples; March 10th, seventeen examples. Since this date the weather has been very cold and wet, so that I have taken very little."

XYLINA CINEREA.

If Professor Riley will refer to Bulletin U. S. Geolog. and Geogr. Survey of the Territories, vol. v., p. 201, he will find why Professor Grote regards X. *Cinerea* as=X. *Antennata*, Wlk. This paper was possibly overlooked by the authors of the Brooklyn Check List. I will add that the Noctuids which I took with me to Europe for comparison were sent to me for that purpose by Prof. Lintner. I have long been familiar with X. *Cinerea*, and the specimen sent to me by Prof. Lintner was in good condition, as was also the type of X. *Antennata*. I compared them carefully, and there is no doubt of their identity.—C. H. FERNALD, Orono, Me.

ILLUSTRATIONS OF NOCTUIDÆ.

(Plate I., Vol. 2).

By A. R. GROTE.

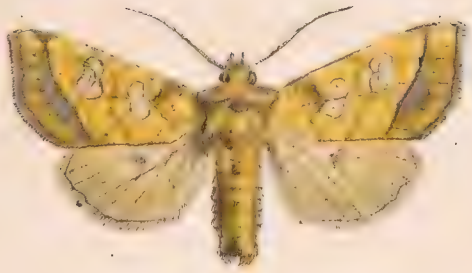
On the accompanying Plate I. figures 1 and 2 represent *Rhodipsa Miniana*, which was discovered by Prof. Snow in Northern New Mexico, and described by myself in "PAPILIO" for October of last year. This species is one of a number of pretty Heliothid forms in which our Western Noctuid fauna is so rich. Figures 3 and 3*a* represent *Gortyna Rigida*,* Grote, an Eastern species collected by Mr. Thaxter in Massachusetts, who kindly sent me the male here represented. I have restored to this genus the term *Gortyna*, not using this name in the restricted sense in which Lederer employs it, viz., for the European *Flavago*, which has the clypeus mucronate, and should be referred to *Ochria*. A synonymical note upon the use of *Gortyna* will by found on page 37 of my "Check List." Figure 3 represents the side view of *Gortyna Rigida*, showing the thoracic tuftings, which are important in classifying the *Noctuidæ*. Figure 4 represents *Schinea buxea*, described by myself in the "Canadian Entomologist," and received from Texas by Mr. B. Neumoegen.

*Erroneously printed "Rifida" in the plate.

ERRATA IN PROF. RILEY'S COMMUNICATION IN THE MARCH NUMBER.—Page 44, line 4, omit the third comma; same page, line 7, for "Danopolis" read "Demopolis;" same page, lines 29 and 31, for "Synonym" read "Synonymy."

1

3



4

3ª

2

Clément pinxit Millot sculp.

1_2 Miniana — 3_3ª Rifida — 4 Buxea

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] May, 1882. [No. 5

LIST OF LEPIDOPTERA TAKEN IN AND AROUND DAYTON, O.

By G. R. PILATE.

Species marked thus * have not been taken by myself; f. p.—food plant.

RHOPHALOCERA.

DIURNÆ.

1 Papilio Turnus, common. Food plant, Tulip tree.
2 " Turnus, ♀ var. Glaucus, not rare, f. p. Tulip tree.
3 " Ajax, common, f. p. Papaw.
4 " Ajax, var. Telamonides, common, Papaw.
5 " Ajax, var. Marcellus, common, f. p. Papaw.
6 " Asterias, common, f. p. Umbelliferæ.
7 " Troilus, common, f. p. Sassafras.
8 " Cresphontes, not rare, f. p. Prickly Ash.
9 " Philenor, common, f. p. Virginia Snakeroot.
10 Pieris Protodice, common.
11 " " var. Vernalis, common in spring.
12 " Rapæ, common, f. p. Cabbage, Nasturtium and Mignionette.
13 Colias Philodice, common, f. p. Red Clover.
14 " Philodice ♀ var. Alba, not rare.
15* " Eurytheme, one ♀
16 Terias Lisa, two or three every season.
17 Terias Nicippe, common, f. p. Cassia Marylandica. L.
18 Danais Archippus, common, f. p. different species of Asclepias.
19 Argynnis Cybele, common.
20 " Myrina, a few every season.
21 " Bellona, common.
22 Euptoieta Claudia, two or three every season.
23 Phyciodes Nycteis, common, f. p. Actinomeris Helianthoides.
24 " Tharos, common.
25 " " var. Marcia, common.
26 Grapta Interrogationis, common, f. p. Elm and Celtis.
27 " Interrogationis, var., Umbrosa, common, f. p. Elm and Celtis.
28 " Comma, not common, f. p. Nettles.
29 " Comma var. Dryas, not common, f. p. Nettles.
30 Vanessa Antiopa, common, f. p. Elm and Willow.
31* " Antiopa, Ab. Lintneri, only one, f. p. Willow.
32 Pyrameis Atalanta, common, f. p. Nettles.

33 " Cardui, common, f. p. Thistles.
34 " Huntera, not common, f. p. Echium Vulgare-L.
35 Junonia Coenia, common in 1880, rare before and after.
36 Limenitis Ursula, common, but hard to catch.
37 " Disippus, common, f. p. Willow, Cotton-wood.
38 Apatura Celtis, common, f. p. Celtis.
39 " Clyton, rare, f. p. Celtis.
40 Neonympha Eurytris, common.
41 " Canthus, rare, only two taken.
42 Debis Portlandia, rare, only four taken.
43 Libythea Bachmanni, not common, f. p. Celtis.
44 Thecla M-Album, rare, one ♂ in 1880.
45 " Humuli, rare, five taken in 1880.
46 " Calanus, common, f. p. Oak.
47 Feniseca Tarquinius, rare, one ♀.
48 Chrysophanus Thoe, common, f. p. Rumex Britannica.
49 " Americana, rare, six specimens taken.
50 Lycaena Pseudargiolus, rare.
51 " " var. Neglecta, common.
51a Lycaena var. violacea, not rare in early spring.
52 Lycaena Comyntas, common.
53 Ancyloxypha Numitor, common.
54 Pamphila Hobomok, common.
55 " Zabulon, common.
56 " " ♀ var. Pocahontas, not rare.
57 " Campestris, common in 1880, rare before and after.
58 " Huron, one ♀.
59 " Phylaeus, rare, six ♂, one ♀.
60* " Pontiac, rare, two specimens.
61 " Egeremet, not very common.
62 " Peckius, very common.
63 " Cernes, very common.
64 " Metacomet, rare.
65 " Verna, rare.
66 Amblyscirtes Vialis, rare.
67 Thanaos Brizo, common in one locality.
68* " Juvenalis, rare.
69 Pholisora Catullus, common.
70 Eudamus Pylades, common.
71 " Lycidas, rare, never taken till last season.
72 " Tityrus, common, f. p. Locust.

HETEROCERA.

SPHINGIDÆ.

73 Smerinthus Modestus, rare, ♂ and ♀.
74 " Juglandis, rare, ♂ and ♀.
75 " Geminatus, common f p. Willow.
76 " Geminatus, var. Jamaicensis, rare, f. p. Willow.
77 " Excæcatus, common, f. p. Wild Apple.
78 Ceratomia Amyntor, not rare, f. p. Elm and Linden.
79 Daremma Undulosa, rare, one ♂.
80* Sphinx Rustica, rare, one ♂.
81 " Carolina, common, f. p. Tobacco.
82 " Celeus, common, f. p. Tomato.
83 " Eremitus, rare, one ♂.
84 " Plota, (Canadensis), rare two examples.
85 " Chersis, rrae, one ♀.
86* Sphinx Jasminearum, rare, one ♂.
87 " Hylaeus, common, f. p. Papaw.
88 " Plebeia, rare.
89 Anceryx Ello, rare, one ♂.
90 Deilephila Lineata, common, f. p. Epilobium Coloratum.
91 Philampelus Pandorus, not rare, f. p. Grape and Five-eaved Ivy.
92 Darapsa Myron, common, f. p. Grape and Five-leaved Ivy.
93 Choerocampa Tersa, rare.
94* Deidamia Inscripta, rare, ♂ ♀.
95 Amphion Nessus, rare, f. p. Epilobium Coloratum.
96 Thyreus Abbotii, common, f. p. Grape.
97 Macroglossa Marginalis, common, f. p. various species of Honeysuckle.

98 Macroglossa Thysbe, rare.
98*a* " tenuis, rare, 3 specimens, f. p. Coral Honeysuckle.

ÆGERIADÆ.

99 Melittia Cucurbitæ, rare, ♂ and ♀.
100 Ægeria Lustrans, common in one locality.
101 " Pictipes, common, f. p. wild and cultivated Cherry.
102 " Acerni, common, f. p. Maple.
103 " Pyralidiformis, rare.

THYRIDÆ.

103*a* Thyris Maculata, rare.

ZYGÆNIDÆ.

104* Psychomorpha Epimenis, rare, one example.
105 Eudryas Grata, rare, f. p. Grape.
106 " Unio, common, f. p. Epilobium Coloratum.
107 Scepsis Fulvicollis, common.
108 Harrisina Americana, rare, f. p. Grape.
109 Pyromorpha Dimidiata, rare, three ♂.

LITHOSIDÆ AND BOMBYCIDÆ.

110 Hypoprepia Fucosa, common.
110*a* Euphanessa Mendica.
111 Crocota Rubicundaria, rare.
112 " Quinaria, rare.
113 " Ferruginosa, rare.
114 Deiopeia Bella, common in 1880, rare in other seasons.
115 " Bella, var. Speciosa, three examples.
116 Callimorpha Leconti, rare.
117 " " var., ? one example.
118 " Interruptomarginata, common.
119 Arctia Nais, common.
120 " " var. Decorata, two ♀.
121* " Virgo, rare.
122* " Saundersii, rare, ♂ ♀.
123 Pyrrharctia Isabella, common, feeds on anything.
124 Spilosoma Acræa, common, feeds on anything.
125 " Virginica, common, feeds on anything.
126 " Latipennis, rare, one ♂.
127 Hyphantria Cunea, common, feeds on anything.
128 " Cunea, var. Textor, common, feeds on anything.
129 Ecpantheria Scribonia, rare, five specimens.
130 Euchaetes Egle, common, f. p. Asclepias Cornuti, D. C.
131 Euchaetes Collaris, common, f. p. Asclepias Incarnata-L.
132 Halesidota Tessellaris, common, f. p. Sycamore.
133 " Caryæ, rare, two batches of larvæ on Hickory and Ash.
134 Orgyia Leucostigma, common f, p. trees of all kinds.
135 Euclea Querciola, rare, one ♂, Honey Locust.
136 Parasa Chloris, not common, f. p. Rose and Papaw.
137 Adoneta Spinuloides, rare, one ♂, f. p. Honey Locust.
138 Thyridopteryx Ephemeræformis, common, f. p. any kind of tree.
139 Lacosoma Chiridota, rare, one ♂ in collection Strecker.
140 Clostera Inclusa, common, f. p. Willow and Elm.
141 Apatelodes Torrefacta, rare, one ♂, f. p. Papaw.
142 " Angelica, rare, one ♂.
143 Datana Ministra, common, f. p. Linden, Elm.
144 " Integerrima, common, f. p. Walnut.
145 Nadata Gibbosa, not common, f. p. Oak and Maple.
146 Gluphisia Trilineata, rare, two examples.
147 Nerice Bidentata, rare, f. p. Elm.
148 Coelodasys Unicornis, common, f. p. Honey Locust.
149 " Leptinoides, rare, f. p. Walnut.
150 " Biguttata, rare, f. p. Honey Locust.
151 Heterocampa Marthesia, rare, one ♂, f. p. Oak.
152 " Marina, larvæ common on Sycamore, but very hard to rear.
153 " Manteo, rare, one ♀.
154 Cerura Cinerea, larvæ common on Willow, but hard to rear.
155 Telea Polyphemus, common, f. p. Oak, Linden, Rose and Maple.
156 Actias Luna, common, f. p. Walnut.
157 Attacus Cynthia.
158 Callosamia Promethea, common, f. p. Wild Cherry, Sassafras and Tulip Tree.
159 Samia Cecropia, common, f. p. Linden, Apple, Maple.
160 Hyperchiria Io, common, f. p. Ash, Willow, Red Clover.

161 Hemileuca Maia, common, f. p. Willow.
162 Dryocampa Imperialis, not rare, f. p. Sycamore.
163 Ceratocampa Regalis, rare, f. p. Hickory, Walnut.
164 Adelocephala Bicolor, not rare, f. p. Honey Locust.
165 Anisota Bisecta, rare, two ♂, f. p. Honey Locust.
166 " Pellucida, rare, one ♀.
167 " Rubicunda, rare, three ♂, one ♀.
168 Gastropacha Americana, rare, three ♀, f. p. Celtis.
169 Heteropacha Rileyana, common, f. p. Honey Locust.
170 Cossus Robiniæ, common, but not easily obtained, f. p. Black Locust.

NOCTUIDÆ.

171 Pseudothyatira Expultrix, two specimens at sugar.
172 Diphthera Fallax, one specimen at sugar.
173 Acronycta Occidentalis, not common.
174 " Morula, rare, at sugar.
175 " Lobeliæ, common, at sugar.
176 " Radcliffei, one specimen at sugar.
177 " Connecta, rare, f. p. Willow.
178* " Furcifera, one example.
179 " Americana, not common, f. p. Maple.
180 " Rubricoma, not rare, f. p. Celtis.
181 " Luteicoma, one example at sugar.
182 " Noctivaga, not common, at sugar.
183 " Afflicta, rare, at sugar.
184 " Clarescens, very common, at sugar.
185 " Hamamelis, rare, at sugar.
186 " Dissecta, rare, at sugar.
187 " Exilis, rare, at sugar.
188 " Oblinita, common, f. p. Willow and almost anything.
189 Bryophila (Jaspidea) Lepidula, rare, at sugar.
190 " Palliatricula, one ♀.
191 " Teratophora, two examples.
192* " Hebraicum, one example.
193 Microcælia Diphteroides, rare, at sugar.
194 " Obliterata, common, at sugar.
195 Agrotis C-Nigrum, common.
196* " Bicarnea, one example.
197 " Tricosa, common.
198 " Herilis, common.
198a " Subgothica, common.
199 " Plecta, rare.
200 " Cupida, rare, at sugar.
201 " Alternata, not very rare, at sugar.
202 " Brunneicollis, not very rare, at sugar.
203 " Clandestina, common, at sugar.
204 " Lubricans, rare, at sugar.
205 " Messoria, common.
206 " Friabilis, one example, at sugar.
207 " Annexa, rare, at sugar.
208 " Ypsilon, common.
209 " Saucia, common.
210 Mamestra Latex, rare, one ♀, at sugar.
211 " Adjuncta, not common, at flowers.
212 " Legitima, not common, at flowers.
213 " (Ceramica) Picta, not rare, f. p. Willow.
214 " Grandis, rare, one example, at sugar.
215 " Subjuncta, not common, at blossoms.
216 " Confusa, rare.
217 " Trifolii, common, at flowers.
218 " Renigera, very common.
219 " Detracta, common.
220 " Laudabilis, rare, seven examples in 1881, at rest.
221 " (Dianthœcia) Meditata, common, at flowers in the fall.
222 " Lorea, common, at sugar.
223 Oncocnemis Saundersiana, two examples, at flowers.
224 Chytonix Jaspis, one ♀, at sugar.
225 Hadena Passer, two ♂, at sugar.
226 " Devastatrix, common, at flowers.
227 " Arctica, three examples, at sugar.
228 " Sputatrix, not common, at flowers.
229 " Apamiformis, one ♂, at sugar.
230 " Lignicolor, common, at sugar.
231 " Vulgaris, rare, at sugar.
232 " Miselioides, not common, at sugar.
233 " Chlorostigma, two ♂, at sugar.

234 Hadena Modica, common, at sugar.
235 " Vulgivaga, one ♀, at sugar.
236 " Rasilis, rare, at sugar.
236a " sp. ? rare.
237 Homohadena Badistriga, larva common on coral honeysuckle, but nearly always ichneumonized.
238 Dipterygia Scabriuscula, common.
239 Hyppa Xylinoides, not very common.
240 Laphygma Frugiperda, one ♂, at sugar.
241 Prodenia Flavimedia, not common, at sugar.
242 " Lineatella, not common, at sugar.
243 Euplexia Lucipara, two examples, at sugar.
244 Brotolomia Iris, one ♂, at sugar.
245 Nephelodes Minians common in the Fall.
246 Hydrœcia (Gortyna) Sera, common, at sugar.
247 " Nitela, one ♀.
248* Achatodes Zeæ, not common, f. p. stems of Elder.
249 Scolecocampa Liburna, common, lives in rotten wood.
250 Leucania (Heliophila) Harveyi, rare.
251 " Commoides, common, at sugar.
252 " Unipuncta, common, at sugar.
253 " Pseudargyria, common, at at sugar.
254 Perigea Xanthioides, common, at sugar.
255 " Luxa, common, at sugar.
256 Amphipyra Pyramidoides, common, f. p. Grapes, Elm, and almost anything.
257 Orthodes Infirma, common, at sugar.
258 " Cynica, rare, at sugar.
259 Orthosia Ferrugineoides, two examples.
260 " Helva, common, at sugar.
261 " Lutosa, rare, at sugar.
262 Scopelosoma Walkeri, common, at sugar-water, in early Spring.
263 Xylina Cinerea, common, at sugar-water, in early Spring.
264 Cucullia Convexipennis, one ♂.
265 " Asteroides, rare.
266 Adipsophanes Miscellus, one ♂.
267 Crambodes Talidiformis, common.
268 Nolophana Malana, common, f. p. Wild Apple.
269 Aletia Xylina, rare.
270 Ingura Abrostoloides, one ♀, at sugar.
271 " Occulatrix, one ♂, at sugar.
272 Telesilla Cinereola, common, at sugar.
273 Plusiodonta Compressipalpis, common.
274 Plusia Aerea, not common.
275 " Biloba, rare.
276* " veruca, 2 examples.
277 " Precationis, common.
278 " Brassicæ, 2 examples.
279 " Simplex, common.
280 Schinia trifascia, rare.
281 Lygranthœcia Spraguei, one example.
282 Heliothis Armiger, common.
283 Pyrrhia Exprimens, not common.
284 Acontia Candefacta, common.
285 " Aprica, common.
286 " Erastrioides, not rare.
287 Chamyris Cerintha, common, at sugar.
288 Erastria Musta, one ♀, at sugar.
289 " Muscosula, common, at sugar.
290 " Carneola, common, at sugar.
291 " Apicosa, not rare.
292 Spragueia Leo, rare.
293 Galgula Hepara, three examples.
294 " Subpartita, not common.
295 Drasteria Erecthea, very common.
296 " Convalescens, rare.
297 Euclidia Cuspidea, common.
298 Parthenos Nubilis, rare.
299 Catocala Amica, f. p. Oak.
300 " Lineella, common.
301 " Minuta, not common.
302 " " var. Parvula, rare.
303 " Grynea, common.
304 " Fratercula, rare.
305 " Gisela, two examples.
306 " Amasia, rare.
307 " Cordelia, two examples.
308 " Dulciola, rare.
309 " Polygama, not common.
310 " Polygama, var. Pretiosa, not common.
311 " " var. Crataegi, not common.
312 " Illecta, common in 1880, rare before and since.
313 " Clintonii, rare, at sugar.
314 " " var. Helene, one ♀
315 " Serena, common, f. p. Hickory.
316 " Nebulosa, not rare.
317 " Habilis, f. p. Hickory.
318 " " var. Basilis, 1 ♀ ex. larva.

319 Catocala Innubens, common.
320 " " var. Hinda, common.
321 " Innubens, var. Scintillans, not rare.
322 " Paleogama, common.
323 " var. Phalanga, not common.
324 " Piatrix, not common.
325 " Neogama, common.
326 " Subnata, not common,
327 " Cerogama, not common.
328* " " var. Bunkeri, rare.
329 " Ilia, common.
330* " Ab, ? two examples, the black bands of secondaries connected.
331 " Parta, not common.
332* " Marmorata, one taken in 1881.
333 " Meskei, two examples in 1880.
334 " Ultronia, common.
335 " " var. Mopsa, common.
336 " Coccinata, not common.
337 " Amatrix, rare.
338 " Cara, common.
339 " Walshii, two examples in 1880.
340 " Judith, not rare.
341 " Epione, common.
342 " Robinsoni, common, f. p. Hickory.
343 " Robinsoni, var. Curvata, two ♀.
344 " Retecta, not rare.
345 " Flebilis, common.
346 " Vidua (Desperata), common.
347* " Viduata, two examples in 1881.
348 " Ulalume, rare.
349 " Lachrymosa, rare.
350 " var. Paulina, one ♂
351 " Obscura common.
352 " Insolabilis, common.
353 " Residua, common.
354 " Angusi, common in 1881, rare before.
355 " Angusi, var. Lucetta, common in 1881, rare before.
356 Allotria Elonympha, rare ♂ and ♀.
357 Spiloloma Lunilinea, common, f. p. Honey Locust.
358 Panopoda Rufimargo, rare.
359 " Carneicosta, rare.
360 Remigia Hexastylus, rare.
361 " Latipes, rare, one ♂
362 Celiptera Frustulum, not common.
363 Parallelia Bistriaris, not rare.
364*Agnomonia Anilis, one example.
365 Eutoreuma Tenuis, rare.
366 Zale Horrida, rare.
367 Homoptera Edusa, common.
368 " Saundersii, common.
369 " Lunata, common.
370 Homoptera, sp. ? rare.
371 Ypsia Undularis, rare.
372 Pseudanthroecia Coracias, rare.
373 Phalaenostola Larentioides, rare.
374 Homopyralis Tactus, common.
375 " Discalis, common.
376 Pseudoglossa Lubricalis, common.
377 " Denticulalis, rare.
378 Epizeuxis Aemula, common.
379 " Americalis, common,
380 Litognatha Nubilifascia, common.
381 Chytolita Morbidalis, common.
382 " Petrealis, common.
383 Zanclognatha Laevigata, rare.
384 " Ochreipennis, rare.
385 " Cruralis, rare.
386 " Marcidilinea, rare.
387 Rivula Propinqualis, common.
388 Palthis Angulalis, rare.
389 Phalenophana Rurigena, common.
390 Renia Discoloralis, common.
391 " Brevirostralis, common.
392 " Flavipunctalis, common.
393 Bleptina Caradrinalis, common.
394 Bomolocha Baltimoralis, one ♀
395 " Manalis, rare.
396 " Bijugalis, one ♀
397 " Abalinealis, common.
398 " Achatinalis, not common.
399 " Profecta, common.
400 " Deceptalis, not common.
401 " ? rare.
402 " ? rare.
403 Hypena Humuli, common.
404 Platypena Scabra, common.

GEOMETRIDÆ.

405 Eupithecia Miserulata, common.
406 Epirrita Perlineata, common in spring.
407 Cidaria Fluviata, common (Plemyra).
408 " Multiferata, one ♂ (Plemyra).
409 " Diversilineata, (Petrophora), common, f. p. five-leaved ivy.
410 " Intermedia, one ♀ (Rheumaptera).
411 " Latirupta, common, (Phibalapteryx).
412 Hydria Undulata, one ♀.
413 Heterophelps Harveiata, rare, ♂ and ♀.

414 Heterophelps Biguttata, common.
415 Zerene Catenaria, rare.
416 Haematopis Grataria, common.
417 Lythria Rileyaria, rare.
418 " Snoviaria, common, f. p. Honey Locust.
419 Thamnonoma Wavaria, f. p. Wild Gooseberry.
420 " Subcessaria, common, f. p. Wild Gooseberry.
421 Phasiane Mellistrigata, one ♂.
422 Semiothisa Ocellinata, rare.
423 Corycia Vestaliata, common,
424 Delinia Variolaria, common, f. p. Willow.
425 " Glomeraria, common in early spring.
426 " Septemfluaria, common in early spring.
427 Calothysanis Amatuaria, common, f. p. Dock.
428 Acidalia Insularia, rare.
429 " Nivasata, rare.
430 " Inducta, one ♂.
431 " Enucleata, common.
432 Dyspteris Abortivaria, rare.
433 Synchlora Rubivoraria, not rare.
434 Anisopteryx Vernata, common.
435 Phigalia Strigataria, one ♂.
436 Hibernia Tiliaria, 2 ♂.
437 Amphidasys Cognataria, rare, f. d. Honey Locust.
438*Biston Ursaria, one example.
439 Paraphia Unipunctaria, one ♀.
440 " Deplanaria, rare, f. p. Hickory.
441 Tephrosia Canadaria, common.
442 Boarmia Crepuscularia, common.
443 " Pampinaria, f. p. Honey Locust.
444 Bronchelia Hortaria, rare.
445 Hemerophila Unitaria, one ♂.
446 Nematocampa Filamentaria, common.
447 Hyperetis Nyssaria, common.
448 Plagodes Floscularia, rare, ♂ and ♀.
449 Angerona Crocataria, common.
450 Sicya Macularia, rare, one ♀ f. p. Ash.
451 Metrocampa Perlaria, rare.
452 Therina Fervidaria, one ♂.
453 " Seminudaria, one ♂,
454 Endropia Hypochraria, common.
455 " Pectinaria, rare.
456 " Obtusaria, rare.
457 Eugonia Subsignaria, common, f. p. Elm.
458 Caberodes Confusaria, rare.
459 " Var. Metrocamparia, common.
460 Tetracis Lorata, rare.
461 " Crocallata, rare.
462 Eutrapela Transversata, common
463 " Clematata, rare.

Geometridæ, 2 species unnamed.
Noctuidæ, 5 species unnamed.

Making in all 475 species and varieties taken in this locality.

Catocala sappho was seen last season by my friend Dr. H. Jewett, but unfortunately he was unable to take it.

Taking "at light" has never been tried here, and "sugaring" only part of one season; so I have no doubt that many species marked *rare* on this list will in time prove *common*.

Most of the Catocalæ have been taken on trunks of trees in the day time.

Many larvæ have been taken by "bush-beating," but I have been unable to rear the greater part of them, especially those that hibernate in the larva state and do not pupate till spring.

DAYTON, Ohio, *March* 14, 1882.

ÆGERIAN PARASITES.

BY HERBERT OSBORN, Ames, Iowa.

In the July number of "PAPILIO" Mr. G. H. French mentions the discovery of a parasite upon *Ægeria syringæ*, and it will be seen from the following notes that I have made observations that entirely agree with his in regard to the fact that *Ægerians* are parasitized. My first observation was made in 1878, when two chrysalids of *Ægeria syringæ*, found in branches of ash trees, produced each a perfect *Ichneumon*. A note in regard to this I published in Trans. Iowa Hort. Soc. for the year 1878. In 1880 I collected quite a number of larvæ and pupæ of *syringæ*, from

young ash trees, to which they had done a great deal of injury. Of these nearly fifty per cent produced specimens of this same parasite, and an account of its work and appearance was published in a paper in the Trans. Iowa Hort. Soc. for 1880. The parasite appears somewhat later than the adult moth, and chrysalids containing parasites can readily be distinguished several days before their emergence. About the time when the adult moth might be expected an examination of the pupa case will show through its transparent walls another pupa, somewhat smaller, within it, the substance of the host being entirely devoured. The adult is black throughout, except joints, 11-16 of the antennæ, a frontal border, dot in front of tegulæ and base of anterior tibiæ, which are yellowish white; wings fuliginous. Length 60-70 in. It seems to me to correspond most closely to *Ichneumon malacus*, Say, and to the variety once described as *afer* by Cresson, but differs in having the front bordered with white and the anterior tibiæ white at base.

This, with the *Phæogenes ater* mentioned by Mr. French, makes two species (one of which, at least, is rather common,) which are now known to be parasites upon this *Ægerian*.

Mr. French is surely right in saying that the eggs are not laid after pupation of the host. Although I have not been able to ascertain positively, I incline to think the eggs are deposited in the larva in its early stages, otherwise the parasite must pass a large portion of its life, and hibernate, as adult, and then find its prey quite well protected.

In my notes upon this *Ægerian* I erroneously called it *denudatum*, being misled by Harris's account of that species.

I have also found a species of *Crabronidæ* in the burrows made by the larvæ, but suppose it simply occupies it after the *Ægerian* has vacated it.

ON CERTAIN PYRALIDÆ.

By A. R. Grote.

My kind friend, Mr. Goodell, has sent me a box of Massachusetts moths, among which are a few *Pyralidæ* of interest.*

Asopia Costalis. *Fabr.*

The specimen is the smallest I have seen, about half as large as is usual.

Arta Statalis. *Gr.*

This species seems to be common in Massachusetts. I have seen it in several collections.

Botis Plectilis. *G. & R.*

Common also in New York collections.

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* A severe illness has prevented my examining my correspondence since my return from Europe until now.—A. R. G., May, 1882.

BOTIS ADIPALOIDES. *G. & R.*

The typical form with yellowish ground color. A variety has them white. I hardly think our own and Prof. Zeller's Texan specimens registered under this name really belong to this species.

BOTIS ABDOMINALIS. *G. & R.*

Belongs to the typical form, as illustrated by us. Hubner's *Argyralis* has the fore wings buff yellow and showing silvery marks. Here the exterior line is black and thread-like, enclosing here and there a minute white dot. Prof. Zeller's *Fracturalis* varies in color also and in size and position of the silver spots. That these all belong to one species has been suggested. Meanwhile the different forms are easily recognized and kept apart.

METREA.* n. gen.

Front flat. Maxillary palpi small, scaled. Labial palpi rather short; third article short, dependent. Tongue moderate. Vestiture mixed with flattened scales. Wings wide and ample. Fore wings rounded at apices with full external margin. Size above the average in the group. Veins three to five equidistant on both wings. Secondaries full. The species is thinly scaled, iridescent, white and pale yellow; the ample wings seem frail and tenderly colored. Ocelli present, small and well hidden.

METREA OSTREONALIS. n. s.

Fore wings very light yellow, almost white, with an oblique, nebulous, blackish mesial band, resolved into three large spots, the two lowest divided by vein 1. An exterior, sub-marginal, bent, blackish band, not obtaining above vein 6. The external median line is indicated on costa, and is indistinctly continued till it touches the lower of the mesial blotches. Fringes white. Hind wings white, glistening, with a pretty purplish iridescence. Tegulæ white. Head, dorsum of thorax and also the abdomen above, blackish. Segments narrowly edged with white. Beneath white, fore legs fuscous inwardly. Amherst, Mass.

In my collection is a New York specimen of this fine species, hitherto unlabeled by me. It departs from the Botyde genera by the blunt primaries, and should find its place near the close of the series of *Pyralididæ*. The small, conical, dependent, third palpal article is apparently naked.

ARGYRIA AURATELLA. *Clemens.*

Professor Fernald's table of the species of *Argyria*, "North American Entomologist, I., 102," is most useful to determine the different kinds. *Auratella* is apparently more common in collections than its near ally *Pulchella*.

CRAMBUS DISSECTUS. *Grote.*

The specimen has the outer white spot, beyond the mesial notched stripe, a little smaller than usual. From the white vertex and thoracic disc, this species is allied to *Interruptus*.

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* Gr: *μετρεὶν*.

CRAMBUS TOPIARIUS. *Zeller.*

This interesting species represents the European *Hortuellus*, in our fauna, according to Prof. Zeller. It is widely distributed.

ON THE AMERICAN FORM OF PAPILIO MACHAON, LINN.

BY W. H. EDWARDS.

Some years ago, by the kind aid of Mr. W. F. Kirby and Dr. Hagen, I was able to bring together a long series of *Machaon* and its varieties from many localities in Europe, also from India, Himalaya, Central Asia and Kamschatka. From America I have several examples from Hudson's Bay and Alaska, and have examined a specimen taken at the Dalles, Columbia river, by Mr. Henry Edwards. On comparing the American examples with those first mentioned, I find that they, as a whole, differ considerably from most of the others, but come nearest, and indeed are very near to the variety from Himalaya, labeled in the collection of the Mus. Comp. Anat., Cambridge, "*Asiaticus, Ménétriés.*" This variety was characterized as having a very broad marginal border to the hind wings, the inner edge of which border was straight and reached nearly to the end of the cell. Emphasis is placed on the straightness of this edge, as if it was the principal character by which the variety was to be known. Ménétriés, Desc. des nouvelles Espéces de Lep. Diurn., etc., St. Petersburg, 1855, p. 69, gives P. *Machaon*, var. *Californica*, syn. of *Zelicaon*, Lucas, (*Zolicaon* Bd.); and next, var. *Asiatica*, describing this last as follows: "Cette variété différe du *Machaon* d'Europe en ce qu'en dessus les secondes ailes ont la bande noire postérieure tres large et bien limitée; celle-ci part du bord anterieur et se dirige en ligne *droite* (so in italics) alteignant presque la cellule discoidale, jusq' à la lunule anale. De l'Himalaya et du Kamtchatka. N. B. Les individus d l'Himalaya présentent de plus, la bande noire du bord posterieur des premiéres ailes beaucoup plus large."

One of the two Himalayan examples examined by me answered very nearly to this description, but the inner edge of the broad border of hind wing was not straight, but wavy, and was slightly concave. Also, it did not approach the cell very closely in consequence of its concave outline. The other example had that edge still more concave, and it was irregular, and was precisely like several of the examples from Europe in these respects. Two males (only examined) from Kamtchatka were small, and the borders of both wings were very narrow, while on the hind wing of each the inner edge of the border was unusually concave, so that the distance of same from the cell was greater than in any others examined.

Felder, Spec. Lepid., 1864, p. 26, gives *Asiaticus* Ménetr. as var. of *Machaon*, and in explanatory note, p. 75, says that the hind wings are shorter than in the typical *Machaon* and more produced in the anal region. He gives the localities as India and Himalaya, and queries whether the Kamtchatkan form is the same thing.

It seems to me that the name *Asiatica* of Ménétriés does not apply to the prevailing type in Southern Asia, but only to a certain variety of same, in which the edge of the border of hind wings is straight and placed very near the cell, and that the prevailing type is so far unnamed.

Mr. Scudder described P. *Aliaska* in Pr. Bost. Soc. N. H., 5, p. 45, 1869, as a distinct species, and compared it at length with P. *Zolicaon*, Bd., for its justification. Of course, as compared with *Zolicaon*, it is distinct, but the comparison should have been made with the Asiatic *Machaon*.

So far as I am able to discover from the examples under view, the American form differs from the Himalayan and all the old world types, 1. In having the hind margins of the fore wings decidedly convex, often largely so, and that in both sexes, which is owing to the shorter costal margin in the former. In other words, the fore wings of the typical *Machaon* are more produced. 2. The black parts are more intensely colored, and less dusted with yellow scales, and the nervures and branches, particularly on secondaries, and the median nervules of primaries, are very considerably edged with black. In most of the old world examples the hind wings have no black except at end of cell, and on the median nervure against cell, so that the wing is divided into a yellow area, which includes the base and disk, and a black area, namely, the marginal border. The Himalayan examples resemble the American in this respect. The same difference holds on comparing the lower sides; that is to say, the American form is more melanic than the old world forms, excepting the Himalayan. If M. Ménétriés had not limited his *Asiatica* to the examples which have a straight edge to the inner side of the marginal border of hind wings, probably his name should cover the American form. But, as he saw fit to limit it, I think the usual Himalayan type is unnamed, and the American certainly may be designated as *Aliaska*, Scudder. There is a great uniformity between all the American examples under view, viz., four from Hudson's Bay and eight from Alaska. Mr. Scudder says sixteen specimens were obtained by Lieut. Dall, and we may infer that he examined them and found them essentially of one type, as he says nothing of differences. Moreover, he had at same time one of my Hudson's Bay specimens, and alludes to it as being like the others.

Machaon seems to have been first noticed on this continent by Mr. C. Drexler, who traveled in British America, under the

auspices of the Smithsonian, in 1860, and from him I received the specimens which I now have. Mr. Drexler told me that they were taken at Rupert House, and were picked off the gooseberry bushes in early morning, while stiffened with the cold; also, that the species was abundant there. Lieut. Dall took his examples at Nulato, May 20th and 24th, and others June 5th and 14th, about the Ramparts. Mr. Turner and Mr. E. W. Nelson found the species common at St. Michael's, on the coast above the outlet of the Yukon River, and Mr. Henry Edwards has taken one example at the Dalles, Columbia River.

Machaon is found throughout Europe, from Lapland to the Mediterranean; also in Northern Africa and Egypt, and throughout Asia to Pekin, and from India to Siberia; also in Japan, the examples found there not differing much from those found in the Netherlands, as De Haan states. Keferstein, Stett. Zèit., vol. 30, p. 211, 1869, says that *Machaon* in the Alps flies at an altitude greater than 5000 feet, and in the Himalaya at 9000 feet. It seems adapted to every climate, and is the only Papilio known to fly over the subboreal regions of both continents. Nevertheless it has not been taken south of the northern boundary of the United States so far as recorded, except in the single instance above spoken of on Columbia River. Mr. Morrison, who collected in that district two years ago, did not see it, nor did the late Mr. Crotch, who collected at Vancouver's Island, and in British Columbia as far to the north as Bald Mountains, bring back any examples of *Machaon*. This is in strong contrast to its wide distribution in Europe, Asia and Africa. Hoping to naturalize the species here in West Virginia, I turned loose more than 100 butterflies last year, which came from a lot of chrysalids imported from Germany by Mr. T. L. Mead. But a day or two after they were freed they had disappeared. I hoped to see some of them again this spring, flying with *Turnus* and *Trolius*. These last species are flying abundantly as I write, but no *Machaon* has presented itself, and I have little hope of the success of the attempt to introduce them.

In the Entomologists' Monthly Magazine for April, 1882, vol. 18, is an admirable description of the preparatory stages of *Machaon*, by Mr. Wm. Buckler, and inasmuch as no adequate description, especially of the larval stages, was ever in print before, I have asked the editor of "PAPILIO" to give this to his readers. It is not likely that the present generation of lepidopterists will have the opportunity of breeding the American form of the species—not till the steam whistle is heard at Hudson's Bay, or Alaska and Behring's Straits become summer watering places. And it is highly probable that all the preparatory stages of the American form will, when hereafter observed, be found identical in color and markings with the Asiatic or the European. I do not mean to say that the larva of *Machaon* has not

been described, for, indeed, it has often, but not with regard to its several moults. Until recent years it was thought sufficient to describe, and usually in general terms, the adult caterpillar, or at the most, to describe without regard to moults, as young, half-grown, three-quarters grown, etc., and until Mr. Buckler bred *Machaon*, as he relates, in 1880, with the express desire of ascertaining the number of moults the species was subject to, I, for one, could get no definite information on the matter. Several old authors had stated that there were four, as Chr. Schwarz, 1791, C. Valoren, 1859, as Dr. Hagen informed me; but later ones, to whom I had access, gave no definite information about it, and two well-known entomologists to whom I applied thought the number was but three. Mr. Buckler's paper has the credit of clearly establishing the number of moults in *Machaon* and for the first time carefully describing them.

"TINEIDÆ" OR "TINEINA."

By THOMAS, LORD WALSINGHAM, F. Z. S., Etc.

In a paper published in the Journal of the Cincinnati Society of Natural History for April, 1882, vol. v. p. 5, Mr. V. T. Chambers discusses the antennæ and trophi of Lepidopterous larvæ, offering the results of his observations "as suggestions to systematists of the Lepidoptera" which "may aid somewhat in their classification, especially in that of the Tineina." He then writes, "these do not constitute a family in the sense that the Noctuidæ, Geometridæ, etc., are families. The Tineina is (*sic*) a large group of many families, some of which seem to me to be as far removed from each other in a natural system as they are from any of the Macro-Heterocera."

In a foot-note at the bottom of page 5 we read: "I have sometimes been asked why I used the name Tineina instead of Tineidæ. I trust the above remarks afford a sufficient answer. Besides, 'Tineina' is the term adopted by the editors of the 'Natural History of the Tineina,' the standard work upon the group."

Although the precedent quoted by Mr. Chambers is rightly entitled to respect, there are certain rules generally recognized among naturalists of all countries by which, for the sake of uniformity, it is most desirable to be guided. Probably the best modern authority that can be quoted upon this subject is to be found in the "Rules of Zoological Nomenclature by Hugh E. Strickland," originally drawn up by a committee of the British Association in 1842; revised, corrected, and reprinted, by their authority, in 1863 and 1878.

These "Rules" consist of a "Series of propositions for rendering the nomenclature of Zoology uniform and permanent." Turning to p. 23 and p. 17 respectively of this pamphlet we find:

"[Families to end in *idæ* and subfamilies in *inæ*.] The practice suggested in the following proposition has been adopted by many recent authors, and its simplicity and convenience is so great that we strongly recommend its universal use:—B. It is recommended that the assemblages of genera termed families should be uniformly named by adding the termination *idæ* to the name of the earliest known, or most typically characterized genus in them; and that their subdivisions, termed *subfamilies*, should be similarly constructed, with the termination *inæ*." Thus, if this rule be accepted, it follows that the appellation "Tineina" should be applied to a *sub*family, and should indicate a division inferior rather than superior to the family Tineidæ. Mr. Chambers, however, rests his claim to the use of the term "Tineina," in the sense adopted by him from the authors of the 'Natural History of the Tineina,' upon the ground that the various genera or groups of genera which it has been made to include do not constitute in themselves a natural family.

Alluding to the old subdivision of the group into two families, Tineidæ and Hyponomeutidæ, by Stephens, he writes, "It would be, perhaps, even more unnatural to put them all in a single group of Tineidæ. Mr. Stainton's system, in which the name Tineidæ is retained for the restricted family containing *Tinea* and its allies, is the best classification of the group with which I am acquainted."

The only objection now raised against Mr. Stainton's use of the name "Tineidæ," as strictly indicating a *family*, is that it should not be made subordinate to the name "Tineina," the termination of which, by the British Association rules, is such as to indicate an inferior subdivision.

There are in this case two alternatives open to those who desire to conform to the generally accepted rules of nomenclature quoted above. The first is to adopt the names of the various families in the sense in which they are used by Mr. Stainton and others, and to change the name of the group from Tineina to Tineimorpha, Tineoidea, or such like. The second is to adopt the name Tineidæ, in lieu of Tineina, for what is now usually regarded as a group of families, thus treating them as constituting one family, and to designate the existing families as subfamilies with the termination *ina*, now used with doubtful propriety for the whole group to which they belong.

If we would inquire into the merits of these two alternatives, the first point to be considered is, what is a family?

Regarding it in the accepted sense as an "assembly of genera," each of which possesses, in greater or less degree, the characteristic feature or features of one and all of them, we must ask ourselves whether any one or more than one characteristic generic feature pervades the whole group of genera which have of late been massed together under the name "Tineina."

It is undoubtedly true that great diversity is to be found in the characters which they present; for instance, in the presence or absence of tongue, ocelli, and maxillary palpi, in the form of the wings, and in the structure of the labial palpi and antennæ. Nevertheless it is surely far easier at first sight to separate any of these genera from those of other families than it is to determine, with readiness and certainty, the true position of a Bombycid (which approaches the Noctuidæ), a Noctuid (which approaches the Pyralidæ), or a Pyralid (which approaches the Phycidæ).

Whether by their small size, their long cilia, or their slender and upturned palpi, by the leaf-mining habits of their larvæ or the neuration or ornamentation of their wings, there is in each genus associated with the Linnæan name "*Tinea*" some peculiarity by which its members can without difficulty be recognized as possessing what may, I think, be properly called a family resemblance.

Without at present entering into an elaborate analysis of these resemblances to test the question of how far they may or may not be regarded as of "family" value, it will not be denied that they are far more easily grasped than are those more uniform generic characters upon the strength of which the various existing families have been founded.

There is considerable divergence of opinion between different authors as to the family position of several well-known genera; and, on the whole, it would be perhaps the safest course to adopt the name "Tineidæ" as a family definition coextensive with the "Tineina" of Stainton and other authors, thereby securing a termination uniform with that of the Sphingidæ, Bombycidæ, Geometridæ, Noctuidæ, etc., and to regard the present families as subfamilies, adopting for them the proper termination of such divisions, as Tineina, Hyponomeutina, Adelina, Gelechina, and so forth.

It will scarcely be objected that any necessity for further subdivision except into genera and species has yet arisen or is ever likely to arise.

FOOD PLANTS OF SAMIA COLUMBIA.

From a paper read before the Natural History Society of Toronto, by W. BRODIE.

This species is common in the Muskoka, Nipissing and Lake Superior districts, and extends beyond the height of land towards James's Bay. It no doubt feeds indiscriminately on our coniferous trees as well as many deciduous trees having a northern range. It is very rare in Southern Ontario; those found are probably the

product of fertilized females straying from their habitat in the north.

Spiræa tormentosa, L.
Ulmus Americana, L.
Abies nigra, Poir,
Abies alba, Michx.
Abies canadensis, Michx.
Abies balsamea, Marshall.
Larix Americana, Michx.

TWO NEW GEOMETRIDS FROM MR. NEUMOEGEN'S COLLECTION.

By A. R. Grote.

Chloraspilates Arizonaria. n. s.

♂ ♀. Fore wings dull green, with the costa ochrey, and two ante-apical costal brown dots in the places of the mesial shade and external line. A minute ringed discal dot. At the place of the sub-terminal line two or three superposed brown dots at costa before apices. Hind wings ochre powdered with red, and with a red mesial line and discal dot. Beneath ochre, irrorate with red. Head ochrey. Thorax greenish. Abdomen ochrey. This seems to be larger than the Texan *Bicoloraria*, and to differ by the discal marks and absence of external or other lines on primaries. The pectinate antennæ of the male have also the stem distinctly whitish, as it is in the simple ones of the female. Tucson; several examples. Notwithstanding the differences, we may only have to do with a variety.

Eucaterva. n. gen.

Allied to my genus *Caterva*.

Male.—Labial palpi of unusual length, extended forwards and upwards, curving slightly. The relatively short third article is of the same thickness with the long, closely scaled linear second joint. No ocelli. Eyes naked. Front flat. Labial palpi projecting forwards about as far again as the head is long. Male antennæ bipectinate, with thick, ciliated branches.

Female.—Labial palpi shorter; about half shorter and slenderer than male. Antennæ simple. Body soft and somewhat heavy.

The vestiture is close and evenly laid on, consisting of flatish scales. Wings entire; both sexes winged.

Eucaterva Variaria. n. s.

♂ ♀. White. Size of *Cleoria Pulchraria*. The males are white, thickly sprinkled with blackish, with straight outer and curved inner thick mesial lines and discal dot, much the ornamentation of *Glomeraria*. Hind wings paler, unlined with dot.

The females have the lines wanting and vary by being all white, with black dots sprinkled over external margin and on costa at base of primaries, as well as on the collar and vertex. Palpi black and white. Some females have the primaries widely black, leaving costal edge and inner margin white. The white fringes of primaries are dotted with black. Several specimens from Tucson.

Obituary.

CHARLES ROBERT DARWIN, F. R. S.

On the 20th day of April last a shadow fell upon the earth, and a wail of sorrow went up from the homes of science, for the news flashed around the world that the great naturalist was dead. In this place we desire to do no more than record our loss and to fulfil a duty we have laid down for ourselves of briefly noticing the departure of all who have in any way belonged to the ranks of our association. Mr. Darwin was early nominated an honorary member of the New York Entomological Club, and expressed a warm interest in its purposes. In a letter received from him during the past year, he says: "I like 'PAPILIO' very much, and, though I am not specially an entomologist, it seems to me to be established on a wise principle of investigation, and you will probably do better work by concentrating your inquiries. I wish for it and your society every success." To say one word in praise of a man so worthily honored would be, on our part,

"To gild refined gold."

We would only add our mite of sorrow to the universal grief which the world has laid at the shrine of departed genius and worth, and twine our humble leaf among the laurels placed upon his tomb.—H. E.

NOTES ON LEPIDOPTERA.

NOTES FROM MONROE CO., N. Y.—*Scepsis Fulvicollis.* This species appears to be more nocturnal than most of its family. I captured several in fine condition at sugared trees from the middle of September to the middle of October, last season.

Selenia Kentaria. Several males of this species flew into my room (close to a large wood) the end of April and the beginning of May. The date apparently indicates that, like its European relatives *S. Illunaria* and *Illustraria*, it is double brooded.

Marmopteryx Strigulata. This insect is not uncommon in beech woods near Lake Ontario, in September, but from its habit of resting on the ground and its low, quick flight when disturbed, it is not easily captured. I took five one day and

saw many others. Its peculiar neutral tint renders it difficult to distinguish on the wing.

Epirrita Dilutata. I met with this species among low bushes near the lake the end of October. I captured several, and it is apparently common there.—DAVID BRUCE, April 14, 1882.

ACTIAS LUNA.—A fine and fresh ♀ example of this beautiful moth was taken on Staten Island, May 3, by Mr. Prentice Mulford, of the New York *Graphic*. Is not this very early for the appearance of the species?—EDITOR.

MR. A. R. GROTE'S COLLECTION.—It will be a subject of universal regret among Lepidopterists that this collection, containing over 1200 types of North American species, should have been suffered to leave this country. It has found its resting place in the British Museum, and though it will, in some respects, be fittingly placed, and will be under the worthy charge of that able entomologist, Mr. A. G. Butler, it should, nevertheless, have remained in the United States as a reference for future students. Had the collection been composed of old engravings, broken china, or even of minerals and fossils, it would readily have found a purchaser here. Why should the most useful and practical branch of natural history be so ignored as it is by our men of wealth, and when will the first steps be taken in New York to found what would be one of its most instructive attractions, a Museum of Entomology?—EDITOR.

OCCURRENCES OF LEPIDOPTERA AT SEA.—To the chief officer of the ship Thalia—Mr. Zielke, recently in the port of San Francisco—I am indebted for two large noctuæ allied to *Erebus odora*, which were taken on the 3d of December last at sea, in latitude 37° south, longitude 52° west, which places the locality off the mouth of the river La Plata, in South America, about 250 miles from the nearest land. He also informed me that there were many others round the lights in the cabin at the time these were captured. There is no reason to doubt these facts, as I went to the ship's log-book to ascertain the exact locality, and there found a record of the circumstance. The occurrence is of interest as showing the facility with which insects may be carried from land to land, across apparently impassable distances.—R. H. STRETCH. SAN FRANCISCO, *April* 16, 1882.

LARVA OF GNOPHÆLA HOPFFERI.—As showing the probable position of this species in a natural classification, the following extract from a letter received by me from Lord Walsingham, when he was on his way to England from the Pacific Coast, several years ago, will prove of interest: "I send a single specimen of an insect emerged from the chrysalis to-day, July 16, from pupa in one of my bottles. The larvæ of this species, feeding on a species of *Myosotis*, were not uncommon on the summit of the Siskiyou Mountains (Northern California) in June. They were undistinguishable from, or at least very closely resembling,

the larvæ of *Callimorpha dominula*, but perhaps somewhat brighter in color. I have not seen the insect before." The insect was G. Hopfferi, Grote.—R. H. STRETCH.

EMERGENCE OF BOMBYCIDÆ.—I have found the imagos of *P. cecropia*, *F. Polyphemus*, *C. promethea* and *A. luna* to emerge from the cocoons in the forenoon, usually about 10 A. M.—*C. promethea* somewhat earlier. In every case where the emergence occurred in the afternoon, it could be traced to some abnormal condition. The lapse of several hours is required for the development of the wings and generative organs, so that when darkness comes the females may be sought and fecundated; in warm nights this takes place, and many ova are deposited before morning; if the temperature falls they usually remain in coitu during the night.—W. BRODIE, Toronto, Can.

ADONETA SPINULOIDES.—On August 17, 1880, I secured twenty-two richly-colored, singular-looking larvæ from a small plum tree in my garden. They were placed in a glass box and fed upon leaves from the plum. In a few days the most of them had made their small, parchment-like and nearly spherical cocoons. Of this large number but one reached the imago state, revealing, on the 25th of December, the bronze, drab-shaded, fringed and tongueless *Adoneta Spinuloides*, a pretty moth, but by no means so richly-colored as its larva. Three of these larvæ were secured the next summer (Aug., '81), two of which were destroyed by ichneumons, and but one cocoon was saved. This opened April 14, '82, having remained in the chrysalis some months longer than the one of the previous year, although kept in the same place and with the same temperature. The prevailing color of the larva is pea-green. On a yellow ground, down the back, are five diamond-shaped purple spots. Across each one of these larger diamonds are strap-shaped lines, buttoned at either end. The sides of the larvæ are spined. The spines are yellowish scarlet (or more nearly the color of the watermelon core). There are eleven pairs of spines—the three pair in front and the last three pair being larger than the intermediate ones. All of these spines are again spined with hair-like, pea-green spinelets. Examining one of these larvæ with the microscope, one readily arrives at the conclusion that a greater amount of fine work could scarcely be crowded into so small a space, the largest specimen not exceeding three-fourths of an inch in length.—MRS. JULIA P. BALLARD, Easton, Pa.

ON THE MOTION OF THE WINGS IN DRYING IN PLATYSAMIA CECROPIA.—Both hind wings are brought together by their inner margin and then elevated together with the front pair, then shoved up behind the front pair; then the hind wings are brought down and their inner margins are brought together and the process is repeated.—AUG. R. GROTE.

ON SOME GEOMETRIDÆ FROM DAYTON, OHIO.—The male

of *Floscularia*, now sent me by Mr. Pilate, has the antennæ pectinate. Two specimens of *Glomeraria* have the wings much darker, and an inner band on primaries not noticeable in my type. Three specimens of *Septemfluaria* have only the three ochre lines on fore wings and two on hind wings visible. The external line and blotches are obsolete.—AUG. R. GROTE.

FANS ON THE FORELEGS OF CATOC. FRAXINI. In the Entomologists' Annual for 1871, p. 75, Dr. Knaggs writes: "*Catocala Fraxini* has visited the Regent's Park, and this reminds me that the sight I had of this specimen (alive) taught me something of which I was previously entirely ignorant, viz.: that the creature is endowed, for some inscrutable reason, with large fans (or rather in this particular instance with a large fan) on its forelegs, after the fashion of some *Geometridæ* and *Pyralidæ*." I may add that the structures are very common among the *Noctuæ Quadrifidæ*, though they are frequently retracted, and therefore liable to escape observation. Lepidopterists believe them to be organs connected with the production of a peculiar odor, differing possibly in each species. Tufts of hair, probably homologous in function, occur on the antennæ, or at the base or extremity of the abdomen, of many Lepidoptera, but the present subject is one that has only recently attracted the attention of Entomologists.—W. F. KIRBY. BRITISH MUSEUM.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] June, 1882. [No. 6.

SOME POINTS IN THE NATURAL HISTORY OF PAPILIO MACHAON, L.

By William Buckler.

[Reprinted from the "*Entomologists' Monthly Magazine*," London, April, 1882.]

Contrary to our usual custom, we reprint the following admirable paper, in the belief that it may be of service to those who in this country are studying the life history of our butterflies. It is needless to say anything of the value of Mr. Buckler's careful observations. They will speak for themselves.—Editor.

In offering my notes on the history of this species, I know I am going upon ground to some extent already well trodden, and it is, therefore, not on the plea of telling anything quite new that I put them forward; but, knowing that there is now, more than ever, an interest felt in obtaining exact information as to the process of growth or development in the earlier stages of various forms, and being conscious that I have done my best in this case, I still hope that my work may be of use; I only wish I could impart to others anything approaching the pleasure I myself felt in watching and recording what follows.

In 1868, I had reared the larvæ from two eggs found in Burwell Fen by Mr. W. R. Jeffrey, and two more in 1871, from eggs found by Mr. C. G. Barrett, in Horning Fen, and had taken several figures in either case, but when in 1879 Mr. W. H. Edwards, of Coalburg, West Virginia, put some questions to me on the number of moults and other points connected with them, I found I could not give such positive answers as I could have wished.

I determined, therefore, to rear the larva, if possible, again, and Mr. W. H. B. Fletcher most kindly helped to bring my project within range of possibility by sending me three eggs, on June

4, 1880, which he had found the day before in Wicken Fen, and on the 12th a few more, laid on *Peucedanum palustre*, and eventually three of these proved infertile.

Of course what follows is really the personal history of the individuals which I watched, and though for convenience sake I shall generalize, and sometimes use the present tense and not the past, I wish it to be understood that I speak only of what I was aware I saw; I know I made one omission, which will be noticed in its proper place.

The eggs hatched June 13th–15th, the larvæ in every case making their first meal on the empty shell, and for a day or two I supplied them with garden carrot, but after that they were fed entirely on *Angelica sylvestris;* from first to last each larva was kept separate, and its changes noted in a separated record.

The larva, on first turning its attention to its food plant, scoops out a round cell on the surface of a leaf, but after a few hours takes the bolder course of eating quite through from the edge of the leaf; it does not roam, but continues at the same part till the third or fourth day, when it moves off to some distance and, on a stalk or leaf, spins a few silk threads for a foothold; there it waits from two to three days for the first moult, and when this is accomplished eats the cast skin all to the head-piece, and soon after goes—apparently by design—back to the spot where it was previously feeding, and attacks the leaf again: at this stage I noticed if a larva found a speck of grass on its food, it would pick it up in its jaws, stretch out its body, and somehow project the grass away from the plant: again, after feeding three or four days it retires as before, and prepares for and accomplishes its second moult, which happens on about the twelfth day of its life; similarly the third moult comes on the sixteenth or seventeenth day, and the fourth (the last) from the twentieth to the twenty-third day, the cast skin being always eaten; after the last moult the larva feeds on for ten or twelve days, consuming a great quantity of food and making very rapid growth. I may here note that its usual attitude in repose is from the very first much like that of a *Sphinx*, with the neck arched, and the head bent down. The earliest age at which I *noticed* the curious horns of the second segment was when I touched the larva *just after* its *third moult*; they were then much longer and thinner than they became after the fourth moult; but there accompanied their protrusion a drop or two of clear greenish liquid, and a most penetrating odor, which reminded me of an overkept decaying pine-apple: after the fourth moult the horns were of a shorter and stouter character, but I noticed that when I was holding a larva between my finger and thumb it had the power to lengthen one horn at the expense of the other (which became shorter), so as to manage to touch my finger with it; the horns are extremely soft and flexible. When full grown the larva ceases feeding, and rests for a while, and then commences its prepara-

tions for pupation by selecting a stem, and spinning on it from side to side a number of threads to ensure a good foothold; next, lying along these threads head downwards, it spins at the bottom of them a broad cone of whitish silk, having a sharpish apex; then turning round it creeps up the stem a little, and with the anal legs feels about till they find this cone, when they are placed close together on the stem, but touching the base of the cone, and a slight pushing motion is visible by which their circlet of hooks is fixed in the silk spun on the stem: its tail end being thus fixed, the larva stretches out its head and front segments, lifting up at the same time the first and second pairs of ventral feet, and bends itself backwards in a wide sweep from one side of the stem to the other, as though to be assured there is free room for its movements; it next—while in this semi-detached attitude—and with its thoracic legs rigidly extended, throws back its head, and in this way swells out its breast, like that of a pouter pigeon, leaving a deep hollow between the mouth and the first pair of thoracic legs; then it bends to one side of the stem and spins a broadish attachment for the first thread of the cincture, and presently with a slow and deliberate motion sweeps round as before to the other side, the head all the while wagging as the silk issues from the spinneret and is guided along the hollow above mentioned; as the head approaches the other side the body swells out still more as though to stretch the thread, and give it the necessary curvature; as on commencing the thread, so now on fastening it to the other side, there is a delay for a little, and the fastening seems to be made with a more liquid and glutinous quality of silk than the rest of the thread: the first thread thus completed, the larva proceeds in the same slow and methodical manner—spinning some thirty threads from right to left, and as many from left to right—or sixty altogether for the cincture, the time thus occupied being about one hour and forty-five minutes; occasionally the first pair of thoracic legs seemed to be called in use to assist at the fastening of the ends of the threads: when enough threads have been spun the larva seems to test their strength by pulling them quite taut with its projecting breast, two or three times, and then apparently satisfied, it bends down its head to put it under the cincture, and creeps up inside it till it hangs loosely round its back between the sixth and seventh segments: next it seems to relieve itself by stretching upwards all the front segments that had been so engaged during the spinning, and in a few minutes settles into a quiet posture with head bent down and legs brought close to the stem; thus it rests, and meanwhile the segments of the body shorten, and their divisions deepen; the head becomes bent down close to the stem, while the body is held away from it as far as the cincture allows—drawn tight as it is into the deep division between the sixth and seventh segments, so that only the head and tail are in contact with the stem; at the end of about a day

and a half suddenly the head and front segments are jerked backward four or five times in succession; next the belly is brought close to the stem and the head held up, and then in about five minutes the skin splits open behind the head on the top of the back, and the pupal thorax appears bulging out; presently is disclosed the top of the head, then the upper part of the face, and with a few nodding motions the head is freed, and the skin slowly but easily slides downwards from each side (the cincture causing not the least impediment), and as it goes drags away like little threads the linings of the spiracles; presently from out of the collapsing skin is disclosed the tip of the tail, and there is just time allowed for the observer to see that it is quite *hollow*, when in another moment it is fitted upon the *cone* of silk, and strongly pressed down, and with a repeated half screwing motion the attachment is made complete; meanwhile the moisture which exudes from the pupal surface has surrounded and fairly embedded the cincture at its line of contact with the back; the old shriveled skin now rests in a heap between the lower part of the abdomen and the stem, but is presently, by a slight twisting movement on the part of the pupa, caused to drop off; the head and thorax gradually develop themselves, the former into two largish blunt diverging processes, the latter into a central bluntly projecting eminence, with another on either side; the larval tubercles remain as small blunt conical protuberances, the wing-covers form an angular outline, and the back becomes dull and rough; just four minutes elapse from the bursting of the larval skin to the full disclosure. (Here I must express my regret that I forgot to look for the connecting membrane which was discovered in *Pieris* and *Vanessa* by Dr. Osborne, and described in vol. xv, p. 59, of this Magazine.)

The egg of *Machaon* is globular, having a depression at the base in contact with the leaflet on which it adheres; it is of a good size and with apparently smooth surface, and when first laid is of a greenish-yellow color, quickly turning green, and soon after tinged with violet-brownish, gradually deepening to purplish, and faintly showing the embyro through the shell, which in a day or two turns entirely purplish-black, a process of change similar to that shown by a ripening black currant; the shell next assumes a light pearly transparency, and the dark embryonic larva coiled round within is plainly visible, and in a few hours hatches.

The newly-hatched larva is 3 mm. long, stoutish, with shining black head and black velvety body with dark green segmental divisions, and conspicuously marked with a patch of creamy-white on the seventh and eighth segments; the pale pinkish tubercles, in some instances yellowish, rather bristly,are in two rows down either side, and in about eight hours turn dark drab, and in a day or so blackish like the third row beneath, except those on the white patch, which remain white.

After the first moult, in three days the length is 8 or 9 mm.,

the stoutness in proportion; the head black, and the body velvety-black, bearing two orange dots on the front margin of the second segment, the shining, rather pointed, black tubercles having their bases reddish-ochreous, after being for a day or so green; the white patch as before, but now bearing black tips on the tubercles.

After the second moult the length by the third day has increased to 14 mm., with increase of stoutness; the black shining head is marked on the face with a yellow chevron, and with pale yellow upper lip and bases of papillæ; the black velvety body has the white patch yet more conspicuous and encroaching a trifle on the ninth segment; the front dorsal margin of the second segment is marked with orange-yellow, and minute twin dorsal bright yellow dots are on the third and fourth, and a faint narrow transverse divisional streak of yellowish or grayish between them; other similar short streaks occur on the ninth and tenth. Of the three rows of conical black tubercles on each side of the body, the two top rows have their upper bases half ringed with bright orange color (excepting those on the white patch, which have pale yellow), the lower third row have orange bases like slanting slashes; the anterior legs are whitish, tipped and spotted above with black, each ventral leg with a white crescentic mark above the foot; and there is some white on the anal flap.

After the third moult, in two or three days the length is 22 mm. and the thickness in proportion; the design, now more developed, shows the head yellow marked with black, and when protruded the horns colored orange-red, the ground color is of the palest greenish-yellow, though it is still white on the seventh and eighth segments, but showing only in transverse rings a little wider than the very narrow greenish-yellow ones round the others, for the middle of each segment is transversely banded with velvety black, but narrower on those two with white ground; the segmental divisions are grayish-black; the black velvety bands are intersected with three lines of the ground-color bearing the orange tubercles with black bristly apices except on the thoracic segments, where the black bands are broadest and only broken below, as on them the upper tubercles are completely surrounded with black; all the legs are white, marked with black.

After the fourth moult the length in two days is 31 mm., and in five more days is 46 mm. and very stout, its size and beauty of coloring being now at their greatest; the thoracic segments swell upwards in a rounded arch from the fourth, which is the largest, and viewed from above sharply taper thence to the head, which is the smallest, and bends downwards; the color of the head is bright yellow with a black oval spot on the face and two black streaks down either side, the ocelli in a black patch below, the mouth marked with black in the centre and on each side; papillæ

whitish; on the front marginal ridge of the second segment occur two orange spots and two black spots in front of them close to the head, and between these pairs of spots is the concealed orifice from whence the retractile soft fleshy horns of pinkish-red color dart forth when irritated, and when seen at this period are uniformly stout, with blunt diverging extremities; the ground-color of the smooth skin of the body is a very brilliant pale yellow-green, becoming white on the belly and ventral feet, the segmental divisions widely banded with deep purplish edged with velvety-black, and across the middle of each segment is a broad velvety-black band covered with excessively fine bristly pubescence, and bearing the orange tubercle of the upper row near the front margin, and sometimes also that of the middle row; but generally this transverse black band is interrupted by an isthmus (so to speak) of the ground-color which bears this tubercle; and below there is always a slanting isthmus of ground-color bearing the lower tubercle; on the third and forth segments the broad bands have only this lower interruption, and bear the orange warts of the two upper rows (here diminished in size) in their middle; the anterior legs are white with black tips and joints; the ventral legs have each a narrow streak in front, a spot behind, and a large crescentic mark of black above the white feet, which have dark hooks; on the anal legs this black mark is purplish in the middle; the spiracles are blackish-slate color situate within the lower parts of the black bands; the whitish belly has a central series of blackish blotches, and narrow transverse bands in the deeply sunk divisions.

The pupa, when come to its full color, is pale yellow on the back and abdomen, and delicate light green on the head and wing-covers.

ENSWORTH, *February* 28, 1882.

WHAT CONSTITUTES A SPECIES IN THE GENUS ARCTIA?

BY R. H. STRETCH.

I have recently drawn some fifty figures of insects belonging to the genus Arctia as a portion of the illustrations to my synopsis of the North American Bombycidæ, and in the case of our Californian *A. achaia*, G. and R., have been compelled to give no less than twelve figures to illustrate even partially the variations to which it is subject. I confess myself utterly at a loss to frame a description of the species which shall enable the incipient student, with only one or two specimens before him, to recognize the insect without the aid of figures.

What may be considered a typical specimen has the primaries black, with the markings ranging from pale ochre to cream

color. These markings, when all present, consist of a broad longitudinal band between the median and sub-median vein, two transverse bands, which may be called the sub-basal and median bands, and the terminal mark like the letter B with the upright stroke towards the base of the wing. The veins are also of the same color. On the secondaries, which are red inclining to orange, we have a marginal series of black spots, a sub-marginal series of four, one on the discal vein and two sub-basal spots, those on the costa and outer margin partially fused together so as to become what I designate below as sub-macular.

Now, on the primaries the veins are sometimes entirely black. Sometimes the basal band is absent and sometimes the upright stroke of the B, in which case the end of the wing reminds us of *A. virguncula*. On the secondaries the spots may be either small and distinctly macular, partially fused (= sub-macular) or entirely fused, leaving only an irregular discal patch of greatly reduced dimensions.

Finally, the secondaries may be yellow instead of red. The body parts alone appear of permanent color. I formerly described the yellow form as var. *ochracea*. The following table shows the distinct forms with which I am acquainted:

* Secondaries orange-red, macular;
a Primaries with black veins;
† both bands present... ..... ♂ ♀ 1

a a Primaries with pale veins;
† both bands present..... ♂ ♀ 2

* * Secondaries orange-red, sub-macular;
† both bands present..... ♂ — 3
† † basal band absent..... ♂ — 4

* * * Secondaries orange-red, suffused;
† both bands present..... ♂ ♀ 5
† † basal band absent..... ♂ — 6
† † † upright of "B" absent. ..... ♂ — 7

* * * * Secondaries yellow, macular;
† both bands present..... — ♀ 8

* * * * * Secondaries yellow, sub-macular;
† both bands present..... ♂ — 9

* * * * * * Secondaries yellow, suffused;
† basal band absent..... ♂ — 10

In form 7 the secondaries might be called either red or yellow, the color being doubtful. We are thus confronted with a case in which neither color nor markings can be relied upon to decide what constitutes *a* species, while at the same time the general appearance of the insect is very characteristic.

The same difficulty exists in the species, the different forms of which have been described as *A. docta*, *A. Mexicana*, *A. Autholea* and *A. Arizoniensis*, in which the secondaries of the female are red with black spots, and those of the male white, sometimes spotted and sometimes immaculate, while the primaries in some forms can only be described by locating the position of the spots,

and in others the spots are so much increased in size that we are compelled to describe the pale markings. It takes five figures to illustrate this species.

In *Nemophila petrosa*, Walker, and its ally from Alaska, the secondaries range from nearly white to entire black, and some five figures are necessary to delineate the range of variation, while in the case of our Californian *Leptarctia lena*, Boisd., to figure every form it would be almost necessary to figure every example taken, as it is almost impossible to find two alike. In *A. Nevadensis*, Grote, and its variety *A. Behrii*, Stretch, the black head and thorax are very striking, but the markings on the wings are very variable, and so I might go on with many more of our Western forms.

The same difficulty exists among the forms from the Atlantic States, though whether to the same extent I do not know, not possessing equally full material for study. *Arge* I know to vary greatly, and I should be glad if Eastern students could furnish me with data relative to *A. virgo*, *Saundersii*, *Phyllira*, *figurata*, *celia*, *nais*, and *decorata*.

So far as I see, the vestiture of the body parts is of great importance, and it would be interesting to know whether, on close examination, these will furnish good specific characters. In all my series of *A. achaia*, however they may vary above, the males have a uniform pale ornamentation on the body beneath, and on the same parts the females are always black. In *Autholea* and its allies the tip of the abdomen is always black, etc.

In this connection, I would suggest to Eastern students, who are so situated that they can try the experiment, that much light may possibly be thrown on this intricate question by varying the food of the larvæ; as for instance, take a lot of young larvæ of *nais*, divide them into three lots, feeding one of them on the same food plant throughout, a second also on one plant, though of a different genus—or, what would be better, of a different order if possible—and the third on a variety of plants, changing the species frequently, or keeping a variety in the breeding cage all the time. It would be of great value to note the results, whether one or several forms were produced, as bearing on the question of what constitutes a species in this group. If possible it would be well to know the parent form from which the larvæ were raised.

If those who possess peculiar forms of any of the Eastern *Arctians* would send me pen and ink sketches of the markings, it would greatly facilitate my labors, and due credit shall be given; and at the same time I would ask those who possess good fresh specimens to put on record the results of their examinations into the stability of the coloration of the body parts, as a guide to the separation of the species of this and the allied genera, which vary so infinitely.

NEW FORMS OF NORTH AMERICAN COSSIDÆ.

By James S. Bailey, A.M., M.D.

Cossus Angrezi. n. s.

♀. Head somewhat narrow on the vertex. Collar and head yellowish gray, thorax black; the edges of the tegulæ shaded with yellowish gray. Fore wings with a nearly white ground, shaded with black, and with black reticulations. Hind wings yellowish gray, mottled with blackish outwardly. The fore wings have the costal edge pale, marked with black; the black shading obtains on costa at apical third, and over the whole wing at terminal third, extending obliquely downwards and inwards; there are a series of interspacial longitudinal black streaks before the margin, more or less defined. Fringes whitish, dotted with black opposite the ends of the veins, which latter conversely are whitish. Thorax shaded with yellowish gray behind. Abdomen dark gray. Beneath, the wings repeat the markings very distinctly, owing to the strong contrast of the pale ground color with the black markings. Expanse, 82 mm. 1 ♀. Wells, Elko Co., Nevada. From the late Mrs. Caroline Chase. Type, coll. James S. Bailey.

Cossula. n.g.

Size small. Antennæ of the female bipectinate to the tips, the inner series one-third of the length of outer pectinations. Eyes naked. Clypeus relatively broad. Labial palpi well developed, squamous, third article small; the palpi extend as far as the front. Tongue wanting. Hind tibiæ pilose. Fore wings rounded at apices. Wings broad.

The neuration of *Cossula* is peculiar. The fore wings of *Cossula* are 12 veined. Vein 5 belongs to the series of median nervules, and sets back along the middle of the discal cell, dividing it into two fields, to the base of the wing. Vein 6 is rather weak; 8 out of 7; veins 9 to 11 are simple, thrown off at elbows or angulations of the subcostal vein. The type of neuration of *Cossula*, as well as other *Cossidæ* examined, does not suggest an affinity with *Castnia*, as, I believe, Mr. Butler views the affiliations of the group. We must rather expect to find that the *Tortrices* and *Cossidæ* have been, in times past, nearer allied than at present. The *Cossidæ* are a low form of *Bombycidæ*, and the discovery of small forms like the present materially alter our ideas of the group based on the large of Europe.

Natural History.

We are indebted to the intelligent and indefatigable labor of Mr. Albert Koebele for the discovery of this interesting insect, which he found in the vicinity of Tallahassee, Florida, during May, from the 9th to the 16th, 1880. The larvæ were found boring species of oak and hickory. The presence of the larvæ were detected by the gnawings of the wood being

distributed around the roots of the trees. Mr. Koebele mentions the fact of having seen a single live oak (Quercus virens) standing in an open field which contained many larvæ, and their debris, resembling sawdust, was distributed over the ground around the roots of the tree more than six inches in depth. At the period of pupation the larvæ, as is customary with the *Cossidæ*, takes its position near the surface of the bark. The tunneling is usually conducted near the surface, from one-quarter to one inch beneath the bark. After imaginese emerge their pupa-cases are left protruding through the bark. Specimens of the larvæ and eggs were not preserved for description.

Pupa-case. The long testaceous pupa-case is provided with an irregular series of five tuberculations on each side of the anus; the segments have a narrow mesial corinei near the spiracles.

COSSULA MAGNIFICA. n. s.

♀. Fore wings fuscous gray, smooth, with indistinct fragmentary black reticulations. A light brown patch covers the terminal field of the wing, containing dark brown speckles on the inner edge. Before the patch a light gray subterminal shade. A pale shade about the discal mark. Fringes brown, interlined. Hind wings blackish fuscous; fringes faintly interlined. Front yellowish. Antennæ testaceous, stem with white scales. Collar dark. Thorax light gray, abdomen dark gray. Beneath irregular dotted; costa of fore wings with dark dots; terminal brown patch not defined. Expanse, 36 mm. Habitat, Southern Florida. From A. Koebele. Type, coll. James S. Bailey.

THE NORTH AMERICAN SPECIES OF NONAGRIA.

BY A. R. GROTE.

But few species of this genus, which is allied to *Heliophila* (*Leucania*), are found in collections. After having seen the types of the supposed species described by Mr. Walker, I can discard them as not belonging here (c. f. my notes in "Illustrated Essay" on the *Noctuidæ*). The extent to which the species vary is not known. Guenee describes:

Nonagria Inquinata, Noct. I., 104. "21 mil. Habit of *Fulva*. Fore wings of a dirty ochrey white, the nervules a little paler, and with blackish atoms strewn here and there on the disk, and chiefly below median vein. A black streak interrupted and situate beneath the sub-median vein and filling the space which usually divides the two median lines, the elbowed (t. p.) line partly marked in black. A series of terminal elongated dots. Hind wings dirty white. Beneath, the four wings of a yellowish white without markings. A female specimen from New York in Mr. Doubleday's collection."

The type of this ought to be in the British Museum collec-

tion, but I have not seen it. I believe that Gueneé's types collected by Doubleday will all be found there.

Nonagria Enervata Noct. I. 105. "30 mil. Habit of *Neurica*, but more oblong. Fore wings entirely of a shining, blackish gray-brown; without spots or any distinctive shade on the veins. Only at the extremity of the cell are two superposed blackish points, hardly noticeable, and some terminal dots. Hind wings dark ashen, concolorous. Beneath, the four wings of the same concolorous shade. A single male from Florida; collection of Mr. Doubleday."

NONAGRIA FODIENS. id. loc.

"Habit of *Neurica*, but more oblong. Fore wings with nearly parallel margins of a gray-brown; the median vein and base of sub-median largely powdered with blackish. Traces of the extra-basal (t. a.) line. A double series of dots continued to the margins in the place of the elbowed (t. p.) line (the first series being the line itself, which is interrupted and hardly marked). A black spot divided in two in the place of the reniform. Tips of the nervules forming darker rays and an inter-nervular series of terminal points. Hind wings dirty white, with a vague line and lunule beneath in the female. Florida collection of Mr. Doubleday. A single specimen (♀). Abdomen terminated by a corneous piece, divided in two flattened blades, twisted beneath and bearing hairy or silky tufts."

NONAGRIA LAETA. Morr., Bost. Proc., Oct., 1875.

"Exp., 37 mil. Length of body, 23 mil. Eyes naked. Front with a sharp, horny protection covered with hair. Abdomen extremely long, with a pointed anal tuft, which conceals the long, curved ovipositor of the female. All the head and body parts concolorous with the wings. Anterior wings brown, with a few longitudinal yellowish scales; all the veins dark, purple brown, contrasting; a blackish, diffuse discal spot; fringe concolorous, having a darker shading at the base. Posterior wings gray-brown, lighter and yellowish at base; fringe yellow. Beneath, brownish yellow; central portion of the anterior wings blackish; discal dots present. New Jersey. From the collection of Mr. Herman Sachs."

Mr. Morrison compares this with *Enervata;* it is like *Fodiens* in the structure of the ovipositor. I have not seen the type. I have bred examples of the European *Typhæ* and *Geminipuncta*, Hatchett, for comparison.

NONAGRIA SUBFLAVA. n. s.

♀. Eyes naked. Clypeus horned. Dusky yellow or buff. Median vein smeared with black. A single row of distinct black dots on the veins in the place of the t. p. line, obsolete on costa. Stigmata vaguely indicated by paler shades. Nervules paler than the wing, terminally accompanied by blackish shadings. Fringe concolorous. Hind wings, yellowish whitish; no marks. Beneath

without marks, yellowish white. Head and thorax dusky buff; abdomen paler. Northern Illinois. Smaller than *Typhæ*.

The following is probably the male of *Laeta:*

♂. Forewings rich, reddish brown, the veins nearly black; they might be called purplish black or brown. The interspaces have a paler, somewhat yellowish tint. No lines and no discal spots. Hind wings reddish brown, a little paler than primaries and paler at base. Body duller and lighter brown. Eyes naked; front mucronate. Beneath without marks, paler; disk of primaries a little blackish.

That there are no discal marks makes me doubtful. No. 1, Kittery Pt., Me. Coll. R. Thaxter.

The following is probably a modification of *Subflava:*

♀. Paler, dusty yellowish or ochrey, terminal space continuously fuscous and contrasting. Smaller than the type. Hind wings pale, with a very faint indication of an extra-mesial line. T. p. line a single row of black dots. Stigmata indicated by paler shades on the disk; all three indicated. No. 2, Kittery Pt. Mr. Thaxter's collection. The following may be an unnamed species; the specimen is a little rubbed:

♂. Fore wings reddish brown, the veins indistinctly paler. The t. p. line indicated. The discal stigmata indicated by brighter colored shades. Hind wings pale yellowish, contrasting. Head and thorax sable brown. Abdomen lighter. Beneath pale, with a vague blackish extra-mesial band. The veins tend to be outlined in black on fore wings alone. No. 3, Kittery Pt. Collection of Mr. Thaxter.

NONAGRIA OBLONGA. n. s.

♂. Pale reddish or yellowish gray, something the color of *Mythimna Pseudargyria*, Guen. Primaries somewhat oblong, internal angle rounded away; apices softened, costa a little arched. Eyes naked. Clypeus mucronate. Palpi prominent, concolorous. Markings obsolete. The fine, dark, linear denticulate t. p. line barely discernible. Stigmata very vaguely indicated by paler shades. Hind wings with a faint mesial black shade band; centrally stained with blackish; fringe and external edge like abdomen and very little paler than the rest of the insect. Beneath pale, with the disk of fore wings blackish; a common blackish extra-mesial shaded line. Minute black discal points. Smaller than *Typhæ*. No. 5, Kittery Pt. Coll. R. Thaxter.

FURTHER NOTES AND DESCRIPTIONS OF NORTH AMERICAN ÆGERIADÆ.

BY HENRY EDWARDS.

TROCHILIUM GALLIVORUM. Westwood.

My friend, Mr. W. F. Kirby, of the British Museum, writes me with reference to this species: "Westwood's *Troch. gallivo-*

rum has been overlooked by all authors. It was bred from galls of *Quercus patustris*, received from U. States, and was described in Proc. Entom. Soc. (2) III., p. 21, 1854, and in the Gardener's Chronicle for 1854, p. 757, with woodcuts. I know that some gall-feeding species have since been described by American authors, and I have compared the descriptions without being able to satisfy myself as to their identity. Westwood's description is as follows:

"'Exp. al. 8 lin., Long. corp. 5 l. Blue black, with two slender, pale yellow, diverging lines on the sides of the thorax above, and with the edges of the tail also pale yellow; wings transparent except the dark fore margin, a curved bar across the middle, and a pale brown apical border; legs yellow, with a dark ring around the tibiæ near the tips.'"

SOSPITA QUINQUECAUDATA. Ridings.

Mr. Kirby also informs me that the above generic name, which I proposed for the species, is preoccupied. I therefore change it to PHEMONOE.

TROCHILIUM DENUDATUM. Harris.

The ♂ of this species, which appears to have been unknown to Harris, is an insect which doubtless exists in many collections, but from its entire want of resemblance to the well-known ♀, passes probably under other names. Its color is dull brown; the abdomen has no trace of bands in the examples before me, though in very fresh specimens there may be narrow yellow margins to the segments. The antennæ are long, chestnut brown in color, very deeply and densely pectinated, more so than in any other species known to me, the pectinations ceasing about 2 mm. from the tip, where the joints are soldered into a serrated point, surmounted by four fine *ciliæ*. The palpi are pale yellow. Legs chestnut brown. The forewings have the margins rather broadly opaque, chestnut brown; across the cell, and including the discal spot, is an oblique, sub-opaque band, broadest on costa. The nervules and fringes are chestnut brown.

Exp. wings, 36 mm. Length of body, 20 mm.

The sexes were found in coitu by Mr. H. Strecker, who kindly furnished me with his notes thereon, so that there can be no mistake in my present determination. I am inclined to think that this is the species described by Boisduval as *Sesia asilipennis* Lep. Heteroc., p. 391.

FATUA. n. genus.

The extreme difference between the sexes of the above species seem to point to a new genus, for which I have selected the name of FATUA. It may be thus characterized:

Male.—Fore wings long, very much narrowed towards the base, not covered with scales. Hind wings very large, ample, rounded on anal margin. Legs long and slender. Antennæ with very deep pectinations, ceasing before the tip, which is a solid

mass, and bears some fine bristles. Palpi long, terminal joint extremely so, with the basal hairs very dense. *Female.*—Less robust. Fore wings opaque, except a space near the internal angle. Antennæ roughened, but not serrated, much thickened towards the tips; abdomen very long, pointed at the tip, ovipositor protruding, compressed on its lower side into a small groove.

ÆGERIA PRÆSTANS. n. sp.

Head black, with orange tuft on crown; palpi bright orange. Eyes brown; a bluish metallic reflection in front. Thorax bronze black, with orange stripe at the sides. Beneath, the thorax has a pale orange patch below the base of the wings. Fore coxæ bronze black, with orange scales. Femora bronze black, tibiæ deep orange, the posterior pairs brightest in color. Tarsi buff yellow. Abdomen bronze-black above, with faint traces of coppery-red bands at the posterior edge of sixth segment. Beneath, the sides and edges of four posterior segments coppery-red. Caudal tuft also coppery-red, with the sides bronze. Fore wings above, have the margins and discal mark, bright bronze. The transparent space before the cell broadly edged with fiery red. Behind the discal mark, the space is broadly streaked with the same color. Internal margin a patch at base of primaries, and the costal margin of hind wings also fiery red. Beneath, the markings are repeated, but the red shade in more truly orange, and is diffused over the whole of the opaque portions of the wing.

Exp. wings, 23 mm. Length of body, 10 mm.

1 ♂. Washington Ter. (H. K. Morrison).

Type, Coll. B. Neumoegen.

ÆGERIA QUERCI. n. sp.

Allied to *Æg. nicotiana*, Hy. Edw., but much more delicate in aspect, and with the markings paler. Head and thorax bluish-black, the former with bluish scales between the eyes. Antennæ brown black above, yellowish beneath. Palpi blackish-brown, with the basal joints much enlarged. In *Æg. nicotiana*, these organs are golden yellow beneath, and do not present the swollen appearance of the present species. Thorax with narrow lemon-yellow line at sides. Collar and base also narrowly lemon yellow. Abdomen with the posterior edges of 3d, 5th, 6th and 7th segments narrowly, and of the 4th broadly edged with lemon yellow, the band of the last-named segment extending broadly beneath. Caudal tuft rather broad, wedge-shaped, blackish, with yellow hairs intermixed, and with the sides lemon yellow. Pectus lemon yellow. Legs bluish-black, the tarsi and joints of femora and tibiæ whitish. Wings beneath, with costal margin and discal spot, lemon yellow.

Exp. wings, 8 mm. Length of body, 4 mm.

From galls of "Live oak," Arizona.

Type. Coll. Hy. Edwards.

ÆGERIA PROSOPIS. n. sp.

Jet black. Palpi beneath, pectus, fore coxæ, and joints of tibiæ and tarsi, clear white. Abdomen very glossy beneath, but without any trace of a band. Caudal tuft jet black. Antennæ black, unusually thickened through their entire length. The margins of the wings are black, with slight metallic reflection. Transparent space behind cell of forewings, with silvery white streaks, and a silver streak along internal margin. Fringe of fore wings brownish black, of hind pair dull white. Beneath, the wings are white, except the apical margin and large discal spot, which are jet black.

Exp. wings, 15 mm. Length of body, 8 mm. Arizona. 1 ♂. Coll. Hy. Edwards.

This singular species was raised from a gall on the Mesquit. (*Prosopis juliflora*, D. C.) *Gall.* Sub-ovate in form, dull brown in color, surface very much roughened, placed in the axils of the branches.

Length, 30 mm. Breadth, 18 mm.

LARVÆ OF NORTH AMERICAN MOTHS.

By A. R. GROTE.

NOTODONTA STRAGULA.

Larva on willow, smooth, grayish violet, shading to reddish on the dorsum of two last segments; first five abdominal segments with an oblique pale lateral stripe, that on sixth segment reddish; first two segments with a sharp fleshy protuberance on the dorsal line. Dorsal stripe brownish, darker on thorax and on the upper edge of the two elevations. Head and feet brown; anal segment enlarged, terminating regularly and obliquely backwards to the anal claspers. This is probably its final moult.

EULONCHE OBLINATA.

Blackish brown, with tufts of short yellowish hair. A broad yellow band, formed of irregular spots on the segments below the stigmatal line; above this a lateral series of Γ-shaped marks. Segments dorsally elevated. Head dark. Larva on willow.

MAMESTRA PICTA.

Head and feet orange. Velvety black, reticulated with bluish white. Two yellow stripes, subdorsal and stigmatal. Larva on Golden Rod.

PHLEGOTHONTIUS CELEUS.

The brown variety has the head striped with yellow. The stigmata enclosed by the fork of a yellow Y-shaped stripe, the lower line continuous; the thoracic segments frosted with whitish speckles. Larva on tomato.

NOTES ON CERTAIN GEOMETRIDÆ, WITH A NEW BYSSODES FROM FLORIDA.

By A. R. Grote.

I offer the following notes on species from the East, described originally before the publication of Dr. Packard's Monograph. The discovery of a member of the tropical genus *Byssodes* of Guenée in Florida is interesting and, I believe, new.

Selenia Kentaria, *G. & R.*, Trans. Am. Ent. Soc. I., Pl. I., fig. 5–6.

The female of this fine species was discovered by Mr. C. T. Robinson at his country place in Kent County. I am not sure where this typical specimen now is; it is, perhaps, in the Central Park collection. Dr. Packard figures a male specimen, pl. 12, fig. 26. Whether there is a third species of *Selenia*, as might be suspected by Dr. Packard's two descriptions, I have no material to decide. Walker's *Alciphearia* is quite distinct, by its straight lines, from *Kentaria*. Probably to the ♂ figured by him, and which I have never seen, Dr. Packard has given the MS. name *Violasceus*, as would appear from page 525 of his Monograph; he evidently intends our species from his remarks. I have not seen the type since description. As Dr. Packard does not acknowledge it, I judge it did not go to him with the rest of the material sent him for his Monograph, being probably collected later. Our figure is colored in most copies, and represents the female type, which was fresh from chrysalis, in two positions. I do not think there can be any doubt as to the species, which appears early in the year, and is hitherto rare in collections.

Endropia Textrinaria, *G. & R.*, Ann. N. Y. Lyc. N. H., Pl. 15 A, fig. 6. ♂.

Our type went to Dr. Packard. This species is "tailed," and cannot be confounded with any other from its ornamentation and shape of wing. Our figure is colored. Dr. Packard figures the larva and pupa from a drawing by Abbott, who gives the food plant as *Uvularia perfoliata*.

Endropia Homuraria, *G. & R.*

The type may be in Central Park collection or in Philadelphia. It is important, perhaps, because Dr. Packard refers the moth to *Duaria*, which seems quite wrong. He does not quote our type. Prof. Lintner showed me a specimen of *Homuraria* collected by Mr. W. H. Edwards in West Virginia. It is allied to *Hypochraria*, somewhat heavier, and more intensely colored, intensely ferruginous and brightly colored beneath. The wings are shaped as in *Hypochraria*, not as in *Duaria*, as I recollect the type. The fore wings have the costa straighter, and appear narrower than in either of its allies. I was quite convinced that the moth was neither *Hypochraria* or *Duaria*, but have had no series to exam-

ine. The angulations are even sharper than in *Hypochraria;* while in *Duaria* they are softened.

ENDROPIA VINULENTARIA, *G. & R.*, Ann. N. Y. Lyc. Hist., Pl. 15 A, fig. 5. ♀.

The type of this was not returned by Dr. Packard, as far as I am aware. It is figured by him on Plate 12, fig. 14 of his Monograph. It cannot be confounded with its ally *E. vinosaria* on account of the simple extra discal line, the dove color or "chocolate-brown" of the wings within the outer median line, and the unbroken purplish terminal field of hind wings. The original figure is colored. There is no doubt of this very pretty species, which is in most collections.

BYSSODES CERUSSARIA, n. s.

Mouse-gray; concolorous. At base of fore wings an ochre line edged without by black and gilded scales. A sub-basal band angulate on sub-costal vein, ochre, edged with black and gilded scales. A similar band at middle of wing, first narrowly black and gilded inwardly, then ochre, then narrowly white. Outwardly the mesial band shows a gilded edge at costa. Hind wings with a continuation of the mesial band, an ochre stripe edged on both sides finely with black and gilded scales; beyond again ochrey. A subterminal bluish metallic narrow band. On interspace between veins 3 and 4 a small red spot edged with silvery and then black scales without; a larger spot on the interspace above. Beneath paler, without marks; a shaded mesial band indicated. Coll. Hy. Edwards and B. Neumoegen, Esqs., Indian River. Allied to Drury's *Geometra Argentata* from Jamaica.

This species differs from any described by Guenée in this tropical and beautiful genus. With *Cautethia Grotei*, *Scepsis Edwardsii*, *Litoprosopus Futilis* and several butterflies, it shows the relationship of the South Floridian fauna with that of Cuba and the West Indies. Is it not possible that there has been a former connection between the Peninsula and the Islands?

NOTES ON LEPIDOPTERA.

ALYPIA DIPSACI, *G. & R.*—As this species has not occurred, so far as I know, to any collector since Mr. Lorquin supplied the types to Boisduval many years ago, it may be of interest to record the receipt from Dr. Behr of one very perfect male taken recently at Salinas, in Monterey county, California, which corresponds identically with the description of G. & R.—R. H. STRETCH.

XYLINA CINEREA.—In his note on this species (p. 63), Prof. Fernald has apparently misapprehended the spirit and object of my remarks (p. 43), which were designed to refute the charge that the species was known to science at the time of the description rather than to question its identity with *antennata.* The fact that subsequent comparison with Walker's *antennata* showed *cinerea* to be that species (a decision which could not have been reached from the description of *antennata* which Mr. Grote admits "is far from satisfactory") does not affect the case. Yet I referred to the possible doubt implied in the Brooklyn list be-

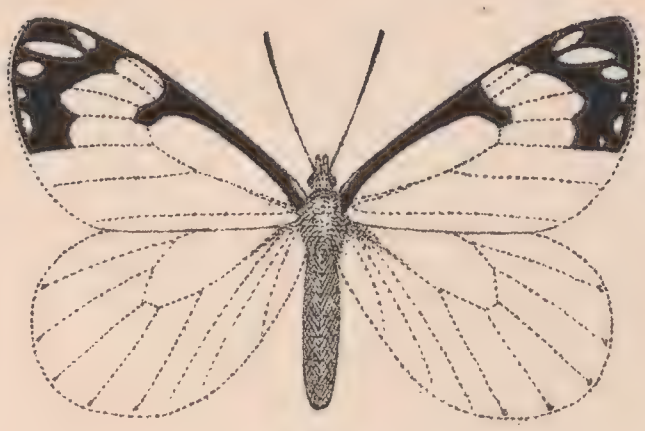
cause I think it is justified. *Cinerea*, as I know by rearing it from the larva is an exceedingly variable species, as some allied European moths are well-known to be. My description included what Grote subsequently described as *laticinerea* and *cinerosa*. Now, if the three forms are worthy of being ranked as species (which I by no means admit), why should any one of them more than another have been chosen as typical of *cinerea?* In answering the question it will be found that opinion has played its part in the matter as against fact, and that the question as to which is *antennata* is quite legitimate! My original description, as stated, included them all, and in fact the *cinerosa* form heads my series. But this name was already preoccupied by Guenée in the same genus, and I would propose the name *Grotei* in its stead, and would thus label the species:

XYLINA ANTENNATA, Walker.
var. *Grotei*, Riley.
var. *laticinerea*, Grote.

—C. V. RILEY.

EGG OF HEMILEUCA YAVAPAI, *Neum.*—Laid in belt-like masses, fastened by a gummy secretion, smooth, rounded, the shape varying according to position in the mass, the inner eggs more elevated and rounded, the outer more elongate, the top flattened, hardly depressed, the surface mottled with a darker green; general color light green.—A. R GROTE.

Papilio. Vol.II. Pl.II.



1. ♂

2. ♂

3. ♀

4. ♀

PIERIS MENAPIA Feld.

Var. Suffusa.

Britton & Rey. S.F. photo-lith. R.H. Stretch. delt.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] September, 1882. [No. 7.

NOTES ON PIERIS MENAPIA.—FELDER.

By R. H. Stretch.

While in company with Professor Hagen and Mr. Samuel Henshaw, of the North Transcontinental Survey, during the present summer, it was my fortune to find this delicate butterfly in excessive profusion, and as it must now take rank among our injurious insects, it is thought that the following notes may be worthy of publication.

Distribution.—The species was first seen by our party at Spokane Falls, in Washington Territory, near the Idaho line, on July 22d, the altitude above the sea being about 1900 feet. The few specimens captured were all males and much worn. A number of others were seen, but their peculiar habit of flitting around the tops of the larger trees prevented capture. On July 23d, I found the larvæ and pupæ in great numbers on the trunk of a yellow pine, at a point on the Colville road, about ten miles north of the crossing of the Little Spokane River, and about ten miles south of Loon Lake, but did not notice the insect on the wing. At Loon Lake a few worn specimens were seen (all males), and I again found the larvæ and pupæ on the trunks of pine trees in immense numbers, say not less than from 200 to 300 within six feet of the ground. Between Loon Lake and Brown's, the latter place being fifty-four miles from Spokane Falls, the same phenomena were again noticed, but with the difference that the imago was emerging in great numbers. I took probably seventy specimens, both ♂ and ♀, in a few minutes, and over one hundred and fifty in the course of the day. It would easily have been possible to make the number 1500. Most of those taken were picked off the trunks of the trees, just fresh from the pupa, having never been on the wing. At Brown's both larvæ, pupæ and imago were equally common, though not many of the latter were on the wing until towards evening, as the day was cloudy. Towards evening the sun shone out for a few minutes, and in-

stantly the air was alive with butterflies, flitting round the pines in countless numbers, and glistening against the dark green of the young timber, like the most delicate snow-flakes. Some idea of the immense numbers of the insect may be gathered from the fact that in the infected district near Brown's, on every little pine, though not more than two feet high, on each terminal bunch of needles, from one to twelve larvæ or pupæ could be counted, and every weed could show its quota of pupæ. Our trip did not extend northward beyond this point, but the appearance of the forest showed that we had not reached the limit of the plague. On July 25th we returned to Loon Lake, finding the insect in all stages, from full grown larva to imago, excessively abundant, with eggs, larvæ and pupæ on both the fir (*Abies balsamii*) and tamarack (*Pinus contorta*) as well as on the pines. Returning south, the insect was common for eight miles; in the next three it grew gradually rarer, and then we lost it altogether, though this may be partly the result of the greater rarity of yellow pine timber (*Pinus ponderosa*) and the predominance of fir and tamarack along the line of travel. On July 27th we saw a few sporadic butterflies as we approached Spokane Falls, say five miles from town. Round the latter place it did not seem to be abundant, but occurred on the 28th in greater numbers, as we approached Cheney by rail, and was seen about ten miles west of that place, or about twenty-five miles southwest of Spokane Falls, near the edge of the timber.

What the extension of this affected area may be it is impossible to say, as there are no accessible data at hand; but as the insect is found in California, in Plumas county about Lake Tahoe and elsewhere, more than 630 miles to the southward, and also in Colorado and Vancouver's Island, it is evidently of very wide distribution, latitude in the north taking the place of altitude in the south; and consequently the same phenomena which we are here called to note may occur in localities where the timber is both denser and more valuable than in that under consideration. Whether it occurs in the coast range in Washington Territory I do not yet know, although we might expect its presence, as the Cascades offer a similar vegetation, as well as from the general similarity of the Rhopalocerous fauna on both sides of the great Columbia plateau, as evidenced by the occurrence of the same species of *Pieris*, *Colias*, *Argynnis*, *Satyrus and Papilio*. The area actually visited where serious damage has been already committed extends about 25 miles north and south, with an unknown width, and in this region *all* the yellow pines have been nearly or totally stripped of their foliage, as well as many of the smaller species of *Coniferæ*.

The appearance of the Forest is peculiar. The first impression was that fire had scorched the tops of the trees, so brown and withered did they look in their clothing of dark, blackish moss;

and before the cause of this effect was discovered, it was only by persistently remembering that all the large fir trees were green that the idea could be kept out of the mind.

Life History.—Unfortunately we were only able to study the insect for about seven days, or from July 22d to 28th, inclusive. During this period we witnessed the pupation of the first brood, the emergence of the imago from this brood and the deposition of the eggs. Whether these eggs will hatch this season or remain as eggs until next spring we do not know. If they do hatch, as is probable, the larvæ will be innumerable and produce widespread devastation. Neither do we know at what period the butterflies appeared in the spring, or whether they appeared at all. From analogy there ought to have been a spring brood, of which we found the descendants; but if so, they do not appear to have specially attracted the notice of the scattered settlers, although they observed great numbers last year during the summer. It is therefore evident that, so far as observations in this part of the country are concerned, there is yet much to be learned. All parties, however, who were questioned on the subject agree that the season of 1881 was the first in which the abundance of the pests was such as to cause general comment, the opinion being often expressed that it was not previously known, although this is evidently erroneous. As the winter of 1880–81 was exceptionally severe and peculiar in some of its meteorological phenomena, it becomes of importance to solve the query whether the sudden increase of this species was due to peculiar climatic conditions which destroyed great numbers of its parasitic or other enemies without impairing its own vitality. Certain it is that the silence of the forest was most remarkable, the absence of birds being specially noticeable, while bats were more than rare throughout the whole region traversed by our party, on both sides of the great plateau.

Habits of the Imago.—The perfect butterfly, when just out of the chrysalis, is one of the most beautiful, but, at the same time, most delicate of its race. It is fragile in the extreme, and soon loses its freshness from its habit of creeping into and between the pine needles in search of the female, or for the purpose of laying its eggs. Great numbers must perish accidentally in high winds; indeed, dead or damaged ones were plentiful in the dust of the roads. Copulation takes place almost directly after emergence, often before the wings are fairly dried; sometimes the ♂ being as fresh as the ♀, sometimes old and worn. The average duration of life is probably very short, and in this connection it would be interesting to ascertain whether the worn males first seen were relics of the first brood or exceptionally early stragglers of the second.

The Egg.—Examination of the abdomen of a female just after copulation disclosed 49 well-formed eggs. Search for eggs

on the terminal needles disclosed them in groups ranging from 3 to 22 in number, deposited in a row on the needles, the eggs not being set upright, but at an angle of about forty-five degrees, overlapping each other like shingles, and apparently thoroughly cemented together. Those found were on young trees which had not been touched by the first brood of caterpillars. A female found in copulâ in the morning was imprisoned about two o'clock on a pine fascicle, and by six o'clock had laid 16 eggs in a continuous row. These were pale green, ovate, with a small white coronet or raised circular ridge at the top, and somewhat flattened on the sides that touched each other.

The Larva.—The earlier stages did not pass under review, but there is no reason to suppose that they differ materially from those about to pupate, which alone came under our observation. Just as the eggs were not laid on the extreme terminal needles, so the larva does not commence feeding on the youngest, and, supposedly, the most succulent needles, but on those which form the base of each terminal fascicle, continuing its devastation towards the tip ; but even in cases where all the needles have been denuded, in no case was the terminal bud touched ; indeed, the needles are only devoured down to the dry sheath which encases their base. On many trees *all* the needles were gone ; on many others there yet remained a few of the terminal ones, and such trees, as Dr. Hagen suggested, conveyed the idea of immense candelabra. It is evident that many of the larvæ pupate on the few remaining needles, where such exist, invariably with the head uppermost ; but many forsake the parent tree, and these are probably such as have consumed all the food in their immediate vicinity. While many larvæ were found ascending the trunks of the larger trees, but very few were found descending them, while a large number were seen hanging at the end of long silken threads, swaying to and fro in the wind. Experiments on these by Mr. Henshaw and myself fully proved the fact that the larva lets itself down from high trees by means of this thread to the ground, abnormal as the habit is among the butterflies. In one case, where the thread was fully 50 feet in length, I passed my hand beneath the larva, to satisfy myself that it was not descending a spider thread already woven (of which I had a suspicion on account of the great number of threads over the bark of the larger trees), and found no connection with the ground ; I then caught the thread above and the larva descended gently, while swaying in the wind, but detached itself directly it touched the first object. Mr. Henshaw obtained the same results. Among the larvæ which thus reach the ground it is evident that many attempt to regain the upper limbs, for I found several trees which had been girdled by stripping off the bark over a length of some four feet, and on such trees several hundred larvæ had been caught on the sticky, resinous surface thus exposed. Perhaps the most extraordinary

circumstance connected with the change to the pupa was the occurrence of many pupæ suspended on their threads, in which case the larval skin is shrivelled up round the last segment of the pupa.

While the favorite food plant appears to be the yellow pine (*Pinus ponderosa*), both *Pinus contorta* and *Abies balsamii* were slightly affected, the latter much the least, and it is not unlikely that these two trees will form the staple food of the next brood in the districts where the yellow pines have been denuded, should it hatch during the present season, as is probable.

Enemies.—The absence of birds has already been noted. May it not be that the larva is distasteful to them? As is well known, it generally happens in the case of native insects that while they may gain a temporary ascendency they are ultimately checked by an overwhelming army of parasites, which relegate them to their normal position in nature. We might thus expect such a thing to occur in this case. Whether this natural check may come into play this year or be delayed for several years, we are not in a position to say. The search for parasitic insects was not productive of either species or numbers. *Ichneumonidæ* were particularly scarce on the wing, both round the trees and on adjacent flowers. Indeed, the only conspicuous enemy was a large heteropterous insect allied to *Pentatoma*, which was not uncommon, and certainly lived on the larvæ, having been taken by myself in the act of sucking out the nearly empty flaccid skin. Many such skins were found upon the needles and on the ground around the base of infected trees. The numbers of this insect, however, were, apparently, not sufficient to produce any appreciable result.

Whatever hope is based on relief from parasitic insects, so far as we know at present, must rest on the large number of parasitical pupæ, although even here the percentage does not appear to be very large, although they are numerically numerous; at least, I judge so, from the following observations. The normal color of the pupa is pale green. All those pupating on the needles of the young pines or shrubby plants in the underbrush were of this color, a close search failing to reveal an exception, while the larger proportion of those on the bark of the large trees were blackish brown. An examination of a number of these makes it probable that they are all diseased, not a few containing a larva, either dipterous or hymenopterous; certainly the latter, in one case at least (one pupa contained a large ichneumon nearly ready to emerge, which was accidentally killed). It is somewhat strange that all these dark pupæ should occur on the bark of large trees. May it not be that their diseased condition had prevented the secretion of silk, and that, being thus prevented from dropping to the ground in the usual way, they had wandered part of the way down the tree before the final change, their restlessness being due to the same cause?

Probable Damage to the Forest.—While the affected trees, at a casual glance, look dead, and are evidently considered by the settler to be killed, it is still an open question whether they are really so. It is true the foliage is gone and the tree must have an impaired vitality, but as long as the terminal bud remains untouched the tree would partially recover itself in the ensuing spring, unless again stripped of its scanty covering. In this case it is probable death would ensue. What remedial measures can be adopted it is too soon to say. Observations should be carried on for the balance of the season, and I have suggested the propriety of this course to Professor Pumpelly, who is at the head of the North Transcontinental Survey.

That such an increase of this butterfly is extremely rare, or that if it does occur frequently it is not fatal to the trees, is proved by the otherwise healthy condition of the timber. The number of trees which may be put down as absolutely dead, but yet standing, is very small, and the fallen trees are practically absent, even in the worst districts. I am, therefore, in hopes that the plague is only temporary and the damage more imaginary than actual.

(Unfortunately my pupæ were killed in transit, by the breakage of a bottle of chloroform, so that I have failed to raise their parasitic contents.)

Technical Notes.—Mr. Henry Edwards has given a good description of the pupa in the Proc. of the California Academy of Sciences, but was not acquainted with the larva. I therefore add a description of the mature form. I have not Mr. W. H. Edwards' figure of the male for reference, but know that it must be good.

Mr. Strecker's figure of the female reminds me of specimens I have seen from California, though it is roughly drawn; but it does not resemble a single female among those taken on this trip. Indeed, when I first took the female I made the suggestion that we had found a new species, as there was no trace of red on the secondaries beneath, and the predominant color was black. Not having types before me for comparison, I am unable to determine whether or not the insect now under consideration is worthy of a special name, and I therefore add a full description of both sexes for future reference.

Description of Imago.—Head and body black above, with white hairs, the latter white beneath. Palpi yellowish, with fringe of black hairs; antennæ black.

♂.—Primaries pure white, with jet black markings as follows: Fringes white, a black costal streak, narrowest at the base, extending to the discal vein, at which point it is suddenly bent inwards and extends over the discal vein to the median nervules. A black apical patch deeply three-notched inwardly, and cut square off on the second median-nervule, containing five white spots; the

costal one small, the second long and ovate, the third and fifth about the size of that on the costa, the fourth minute.

Secondaries pure white, with a few black scales at the base of the median vein; and sometimes in specimens which are very dark beneath, there are visible portions of the submarginal band, as seen beneath.

Beneath, the primaries show the same general markings, but the white spots in the apical black patch are much larger, with more diffuse margins, and are increased to six in number by the addition of one between the first and second at the extreme tip of the wing.

Secondaries pure white; all the veins black, with a narrow submarginal band, most remote from the margin about the middle of the outer edge. Occasionally the veins are intensely black, with the scales spreading more or less over the disc of the wing, in which case there are many powdery black scales, most concentrated along the outer and inner margins, the former in this case having a narrow terminal black line. Fringes white.

In occasional specimens there are traces along the costa and on the outer margin between the nervules, of the red markings so characteristic of the female.

♀.—The primaries differ from the ♂ by the extension of the black apical patch to the inner angle, it gradually narrowing thereto from the second median nervule, and containing a small white spot between the first and second median nervules. The same ornamentation is repeated beneath.

The secondaries above are white, with a marginal and sub-marginal narrow black band. The nervules, black between these bands, dividing the enclosed space into six unequal lunules, as in the male beneath. The outer band sometimes faintly interrupted between the veins with a few orange or brick-red scales.

Beneath, all the veins are broadly black, as are both the outer bands, reducing the white spaces to a series of narrow intervenular patches and six reduced outer lunules, giving the wing a very gray appearance. On many specimens there is no red at all; on others the whitish costal openings and a small patch in the terminal black band between each of the nervules is a brick-red.

Habitat. Country round Spokane Falls, Washington Territory, July 26.

Alar. exp. ♂. ♀ 2.00 to 2.20 in.

Mr. Strecker's figure very fairly represents the upper side of the females here described, but the under side is totally unlike, so far as the secondaries are concerned. In all I have seen from the locality quoted there is more black than white on the secondaries beneath. None of them have so much red; many none at all, and not one shows any trace of the streak near the inner margin. As I have not access to the description of the ♀ by Felder, I forward

a series to the editor of PAPILIO. Should he find them to differ largely from Felder's description, I would suggest the name of "*suffusa*" for this variety, as it is very constant.

Description of Larva.

General color green. Head green, covered with small white points; mouth parts dusky; low down on each side a curved row of four black dots.

Body clear green, tinged with purplish, and with two lateral yellowish-white stripes. In the dorsal green stripe the purplish tint shows itself as a faint dorsal line, and on the edge of the upper lateral line, leaving clear green between. The upper edge of the upper lateral stripe is clean cut; the lower edge more diffuse, shading into green, and that color being tinged with purplish along the upper edge of the lower lateral stripe, which is somewhat broader than the upper one and better defined. Anal segment somewhat horny, narrow, and slightly notched at the tip. Venter, dusky green. Pro-legs black. Abdominal legs dusky green.

Length 1.00 inch.

Note.—I have in this paper assumed that all the damage done to the yellow pines was caused by *P. Menapia*. It is only fair to state that, on the edge of the timber, north of Spokane Falls some three or four miles, I came across a large *Bombycid* larva which denudes the foliage in a similar manner. From one small pine, not more than twelve feet high, I took some thirty specimens, and might have taken a hundred. These were in a district where *P. Menapia* was uncommon. We did not have time to make any extended search on other trees, but it may be possible that a portion of the damage has been done by these insects. It could not have been common, however, in the affected district, as a close watch on the habit of *Menapia* did not reveal its presence. I have a number of cocoons of this insect, from which I hope to raise the imago, which is probably allied to the genus *Parorgyia*. If I succeed, I will put the observations on record.

San Francisco, August 9, 1882.

ON THREE SPECIES OF EUCHÆTES.

BY A. R. GROTE.

I bring together here the descriptions of three speciesof *Euchætes* which are apparently rare, and possibly not sufficiently distinct. Both *Spraguei* and *Abdominalis* differ from Dr. Clemens' *Eglenensis* in having the internal margin of primaries striped as well as the costa. *Eglenensis* agrees with *Abdominalis* in having the costa yellow. Dr. Clemens calls it "pale luteous;" but in *Abdominalis* it is "dark yellow," as I have described it. Except this character, which might be held to be variational, the descriptions of the two are very similar, and their identity might be assumed were it

not for the stripe along internal margin in *Abdominalis*. This, although narrower than the costal edging, is quite plain in my species. Away from my books and collections, I thought that I was possessed of a new *Zygænid* type when I took the specimen in Alabama.

A table of the three species might be made as follows:

Fore wings bluish cinereous or lead color.

Fore wings with costa and internal margin striped.

Stripes crimson.—*Spraguei.*

Stripes dark yellow.—*Abdominalis.*

Fore wings with costa striped.

Stripe pale luteous.—*Eglenensis.*

1. EUCHÆTES SPRAGUEI, Gr. Can. Ent., vii., 200.

♂. Allied to *Elegans*, but entirely stone color, like *Egle*. Fore coxæ, head at base, two thoracic vittæ, costal and internal margin of fore wings crimson. Abdomen above red, with dorsal black dots. Kansas. Prof. Snow.

2. EUCHÆTES EGLENENSIS, Clem., Proc. Ac. N. S., Phil., 533, 1860.

Bluish cinereous. Palpi bright reddish at the base, with dark cinereous tips. The occiput and post orbits are red orange. The external edge of the fore wings is pale luteous. The abdomen above is bright red-orange, with a dorsal row of small black spots and one on each side; beneath, cinereous. The thorax beneath and the anterior coxæ are tinged with red orange. Texas. Captain Pope's collection. Smithsonian.

3. EUCHÆTES ABDOMINALIS, Gr., Can. Ent., 124, 1871.

♀. The wings are lead color; in certain lights the primaries show a bluish reflection, as in *Ctenucha*. The costal region of the fore wings above and below is striped with dark yellow, as in the internal margin. The hind wings are concolorous. Abdomen above orange, with a dorsal and lateral series of black spots; beneath, lead color. Palpi, throat and head behind and between the antennæ bright orange; front dark, as are the palpal tips. Legs dark lead color. Fore coxæ orange. Collar and tegulæ more or less evidently edged with orange. *Expanse* 44 mil. Alabama. A front wing and a denuded hind wing, mounted on card-board, are all that remain of the type, which I discovered among some broken specimens in a forgotten box.

There is a curious resemblance between the species of *Ctenucha* and *Euchætes*, so that the darker forms of the latter genus might be mistaken for *Zygænids* were it not for the *Arctia*-like abdomen. The denuded hind wing of my type of *Abdominalis* is 8-veined; veins 3, 4 and 5, equidistant at base, thrown off from extremity of median vein.

The three "species" here discussed are the prettiest in the genus, and of the three *Spraguei* is the handsomest and most distinctly colored.

ON THE EARLY STAGES OF PAPILIO RUTULUS.—Bdv.

By Henry Edwards.

On Exclusion from Egg.—Head very large, black, shining. Second segment with two tubercles on the sides in front. Body brownish-black. Segments 3, 4, 5, 10, 11, 12 with two tubercles each, arranged sub-dorsally. Extending from the seventh to the ninth segment is a small, but conspicuous, triangular white patch, the vertex of which is directed posteriorly. Feet and legs black.

After First Moult.—The head now becomes pitchy, the body streaked with shades of brown, longitudinally; the two tubercles on second segment are chestnut-brown, and the whole of the processes brighter and more glossy. The white triangular patch is larger and more distinct, and the posterior segments are delicately mottled with brownish.

After Second Moult.—Head chestnut-brown, with pinkish tinge. The tubercles of the second segment are larger than before, and have become yellowish-brown in color. Between them is a yellowish corrugated fold, and on the dorsum, at the base of the longer tubercles, are two smaller ones, also chestnut-brown. Body brownish dorsally, with a green tint throughout; laterally it is pale apple-green. The third segment has six tubercles, the middle and lateral being exceedingly small. Fourth segment swollen, the body here attaining its greatest size. This segment has also six tubercles, the two dorsal being the smallest. The fifth segment has four tubercles, the smaller pair of which are placed anterior to the other. The triangular patch has now become cream-yellow, and encroaches in a point posteriorly on the ninth segment. Segments 9, 10, 11, 12, 13 have each two tubercles, which are directed backward, and increase posteriorly in size, so that those of the thirteenth segment are double the length of those of the ninth. Mouth parts, legs, as well as the whole of the under side, pale bluish-green.

After Third Moult.—The head is now pale bright chestnut, with a decidedly pinkish tint, and the mouth parts of a deeper and more decided green. The body has assumed a pale apple-green color, the tubercles are brighter and more approaching to brownish-orange, and the triangular patch is buff, with some streaks of green running through it. The tubercles of twelfth and thirteenth segments are now yellow, and at the base of those of 5, 9, 10 and 11 are some bluish dots. Upon being touched, the young larva exhibited the usual retractile horns. These were situated at the base of the head, between it and the second segment. They were pale orange, much darker at the tips.

I regret that I could not carry these larvæ further than this stage. I was called away from home, and on my return found them dead. Three larvæ were obtained from eggs observed to

be deposited by the ♀ upon *Alnus viridis*. The following is the record of changes:

Eggs deposited July 8.
Larva hatched July 13.
" first moult July 15.
" second moult July 18.
" third moult July 22.
" showed retractile horns July 24.

THE PREPARATORY STAGES OF PLUSIA BILOBA.—STPH.

By G. H. French, Carbondale, Ill.

Egg.—Nearly globular, the base slightly flattened, the apex slightly inclined to a blunt cone. At the apex is an irregularly punctured space; from near the base run a number of ridges, about twenty of which reach the punctured apical space, many of them not reaching this point, as they are the same distance apart throughout. The depressions between the ridges are filled with a series of quadrate punctures in the centre of each of which is a small elevation. There is no apical depression. Size .02 of an inch in diameter; color white, with a faint creamy tinge; duration of this period five days.

Young Larva.—Length .07 of an inch. Body white or with a very pale tinge of green, head and top of joint two black, piliferous spots black, showing very prominently a single black hair arising from each. Legs 12, for which reason the larva loops when walking; when at rest the front part of the body is generally elevated, though not straightened out like a geometrid. Before eating the food placed in the dish each larva ate a portion, if not all, of its egg-shell, after which it remained quiet for a time. Duration of this period three days.

After First Moult-—Length .16 of an inch. Head and top of joint two pale amber, the jaws a little darker. Body pale translucent green; the piliferous spots large tubercle-like, tipped with black, and each suporting a black hair. The body nearly cylindrical, truncate posteriorly. Duration of this period three days.

After Second Moult.—Length .33 of an inch. Color pale green, the dorsal line darker. Subdorsal line whitish, as also two other lines in the dorsal space. Stigmatal line greenish-white through the middle of the body, appearing to be composed of two lines. Above the stigmatal lines, on joints 5 to 9, is a bright black spot on each joint, the last one small. Piliferous spots concolorous with the body; the hairs pale, each two-thirds as long as the diameter of the body. Head pale amber,

very faintly mottled. Jaws and ocelli brown. Duration of this period three days.

AFTER THIRD MOULT.—Length .55 of an inch. Color pale green as before, though a little more prominent. As in preceding period the dorsal line darker green, the subdorsal white, with two more white lines each side in the dorsal space, these lines a little more distinct than before; stigmatal line as before. In the middle of the subdorsal space is a clear green stripe, bordered each side by a whitish line, and containing the black dots on joints 5 to 9 as before. Head greenish amber, mottled a little with very pale brown, with a more or less distinct dark brown stripe on each side outside of the ocelli. Thoracic legs dark brown, the posterior pair the darkest, the anterior mottled a little with green. Prolegs green. Substigmatal space with a few white dots. Duration of this period four days.

AFTER FOURTH MOULT.—Length .70 of an inch. Color green, the white lines as before, except that the part below the stigmata of the double stigmatal line are nearly obliterated and the lines on the sides and back are connected by spurs, all the light lines faint. Head green, a jet-black stripe on each side connecting in front, antennæ black, the interjoints green. Thoracic feet black, the others green. Legs 12, wfth no trace of the first and second pairs of abdominal legs. The whole body is covered with a short, fine pile which is brown on the sides, but white on the dorsum. The black lateral spots are still present, but are smaller than during last period. Stigmata green, circled with black.

MATURE LARVA.—Length .95 of an inch. The body is from .10 to .12 of an inch in width from the middle joints to the anal, but tapers from the fifth joint to the head, this being .06 of an inch across by .04 deep. The second joint is without cervical shield. The anal extremity is almost truncate. The color remains about the same as at the beginning of this period, save that the white lines are more obscure and the lateral black spots show but little, if any. The other characters are the same as soon after the fourth moult. Duration of this period four days.

CHRYSALIS.—Length .75 of an inch; length of wing case .50, the leg and antennæ case extending .05 of an inch beyond. In shape cylindrical, the abdomen conical. The dorsal and lateral portions of the cephalothorax are finely shagreened, with the dividing lines between the plates shining. The basal joints of the abdomen are somewhat shagreened, but they gradually become shining or polished from before backwards, each one with a slight elevation anteriorly. The last segment ends in a tubercle, which is tipped with a single hook, with which it fastens itself to the loose cocoon. The wing cases cover the ventral portion of the first five abdominal joints, the leg and antennæ case projecting over the sixth. Depth through the thorax .20; 1st abdominal joint .19; 2d joint .21; 6th joint .18 of an inch. Color dark

blackish-brown, the anterior portion of the wings and legs a little pal'er, while the spaces between these is somewhat yellowish, as also the parts between the terminal joints. Duration of this period from the time of beginning to spin nineteen days. The cocoon was loosely spun of fine white silk, and not enough of it to conceal the chrysalis. Two days passed from the time the larva began spinning to the time the last larva skin was moulted and the chrysalis was to be seen.

The eggs were deposited April 27th, and the moths hatched June 8th, making a period of forty-two days from the egg to the imago. Allowing three days from the time the moths emerge before eggs for another brood are deposited, would give us forty-five days as the whole period from egg to egg, though I am of the opinion that it is a few days longer, from the condition of the moth depositing the eggs from which the above notes were taken. This would give us two more broods of moths this season, with another brood of larvæ that probably hibernates in the chrysalis state, or four broods in a season. This is making little or no allowance for delays in some of the larvæ in passing from one state to another; in fact, those that were healthy were very regular in their moults. From larvæ found in the garden at different times there seems to be some irregularity, hence there would be in some cases of retarded development only three broods, while in others four.

The larvæ seemed to be easily affected by external conditions. Out of eighty passing the second moult, I obtained only four chrysalids, and only two of those produced imagines. It should be said, however, that about the period of the third and fourth moults the weather was rainy most of the time, and all my larvæ of other species were somewhat affected by it, but none so much as these. Larvæ found in the garden during that time were affected in the same way.

The food plant not being known, quite a number of tender leaves were at first offered the young larvæ. Among these parsnip, larkspur and clover were eaten, though towards the last, lettuce was given them, as they were found on that. They were, however, fed most of the time on parsnip leaves, as they seemed to prefer that plant.

"TINEIDÆ" OR "TINEINA."

By V. T. Chambers.

I desire to offer a few remarks suggested by Lord Walsingham's paper in the May number of Papilio. I am so completely out of Entomology now, and have done so little in it for the last two or three years (beyond arranging some old notes for publication) that I do not feel qualified to discuss the subjects

embraced in Lord Walsingham's paper, and what I shall now write is simply the impressions left upon my mind by former studies.

I am perhaps too indifferent to nomenclature, and care nothing about whether we write TINEINA or TINEIDÆ. The name does not concern me so long as the thing named is understood, and I shall not enter upon the question as to which of these two names we shall use. But the question whether there is in nature a separate and distinct group of Lepidoptera of higher than generic rank to which either name can be appropriately applied, is one of more importance. Following the authors of the *Nat. Hist. Tin.*, Stainton, Zeller, Frey, Douglass and others (acknowledged authorities as to the insects in question), I have usually written TINEINA. Lord Walsingham, with the majority of entomologists, prefers to write TINEIDÆ, a name which in the *Nat. Hist. Tin.* is applied to a single family of the supposed group. Uniformity is better than priority, and I think it will be more easily achieved by following the authorities above named than by adhering to the older name of TINEIDÆ for all of the various and heterogeneous families forming the supposed group—if there is in nature such a group. Is there?

Lord Walsingham thinks there is. With great respect for the authority of so distinguished an entomologist, I differ with him, and whilst I have used the name TINEINA in a loose and general way for all small moths not clearly belonging to any of the higher groups, I do not believe that there is any such distinct group as TINEINA (or TINEIDÆ). The HETEROCERA are sufficiently distinct, perhaps, from the RHOPALOCERA, though there are "connecting links" even here; but, in my opinion, there is no line separating the TINEINA (I use the name through force of habit) from other HETEROCERA; and the belief that there is has hindered the study of these small moths. Because of their obscurity, and under the impression that they form a distinct group, a knowledge of which was not necessary to a knowledge of the higher HETEROCERA, students of the latter have generally neglected them. But in my opinion they are no more distinct from the higher HETEROCERA than these are from each other; and the *Tineidæ* (restricted), *Gelechidæ*, etc., take rank as families of HETEROCERA just as do the *Bombycidæ*, *Noctuidæ*, *Tortricidæ*, etc., and not as sub-families of a family TINEINA or TINEIDÆ. The line which separates the higher *Tineidæ*, *Gelechidæ*, etc., from the *Tortricidæ*, *Phycidæ*, etc. (sometimes very indistinct), is no more strongly marked than the lines which separate these latter from each other. The name *Tineidæ* probably came to be employed at a time when comparatively little was known about these small moths, and they perhaps appeared sufficiently distinct from the larger forms to give rise to the impression that they were, in fact, a distinct group; and the use of a name for such supposed group has perpetuated the belief

that it had a real existence. It is not my purpose, either now or hereafter, to give the facts and reasons which lead me to the conclusion that there is no such group, as in all probability this is my last contribution (such as it is) to entomological literature; but I wish to offer some remarks upon some of Lord Walsingham's suggestions on this subject in the paper in the May number of PAPILIO. I would have expressed my meaning more clearly and grammatically if I had written in the paper in the *Journal of the Cin. Nat. Hist. Soc.*, referred to by Lord Walsingham, "TINEINA is a name applied to a large group," etc., instead of "TINEINA is (sic) a large group," as quoted by his lordship. It may be as suggested by him (*in lit.*) that "is" is an error of the printer, but it is just as likely that it is the result of my own haste and carelessness in writing. This much, *en passant*, as to the grammar; my present object is to consider briefly some of his lordship's reasons for believing that such a group as the supposed "TINEIDÆ" higher than a genus has an actual recognizable existence as separate and distinct from the higher HETEROCERA.

Lord Walsingham writes (*loc. cit.*): "What is a family?" Regarding it in its accepted sense as "an assembly of genera," each of which possesses in greater or less degree the characteristic feature or features of one and all of them, we must ask ourselves whether any one, or more than one, characteristic generic feature pervades the whole group of genera which have of late been massed together under the name "TINEINA." For myself, I must answer that I do not now remember any such feature which is not equally characteristic of other HETEROCERA, unless indeed it be the small size of most of them. And even if size be regarded as of "family" importance, there are many insects usually included in TINEINA which greatly exceed in size a great many HETEROCERA of "higher" families. If we adopt size as the criterion of a right to be placed in TINEINA, then all species of Dr. Clemens' genus *Anaphora* will have to be excluded. My species *Blastobasis gigantella* will be excluded, whilst all other species of the genus will be included. These species of *Anaphora* and *B. gigantella* equal or exceed in size the average size of species of *Tortricidæ*, *Pyralidæ* and *Phycidæ*, and so do many other "TINEINA" which I have not time now to specify, and they equal in size many *Noctuidæ*. I cannot agree with Lord Walsingham that "it is surely easier at first sight to separate any of these ('*Tineidæ*') genera from those of other families than it is to determine with readiness and certainty the true position of a *Bombycid* (which approaches the *Noctuidæ*), a *Noctuid* (which approaches the *Pyralidæ*) or a *Pyralid* (which approaches the *Phycidæ*)." Indeed, to instance *Anaphora* again, it appears to me that at first sight I should rather refer it to the *Noctuidæ* than to the *Tineina*; and I confess myself, at first sight (for my examination of the insect was brief and incomplete) I was utterly unable to determine in

what family or group to locate the insect mentioned by me in the foot note on page 16 of the paper in the *Journal of the Cincinnati Nat. Hist. Soc.* Possibly it may be related to *Euplocamus*, and on account of its large size, and for other reasons, I have always doubted whether *Euplocamus* ought to be included in the *Tineina*. Lepidopterists are not by any means all agreed as to the upward limits of the *Tineina*. Species and genera which some place in *Tineina* are by others placed in *Tortricidæ*, *Pyralidæ* and other groups. Mr. Stainton and others place *Orthotelia* and *Phibalocera* in *Tineina*. Stephens and others have placed them in *Tortricidæ*, from which "at first sight" I see no reason to separate them. Other instances will doubtless occur to those who are familiar with the *Tineina*, but I write on the spur of the moment, after having read Lord Walsingham's paper, and from recollection only when I am no longer familiar with the subject, and without any special research. *Brenthia*, Clem., is the equivalent of *Limæthis*. With Dr. Clemens, I, on account of its size, cilia and ornamentation, placed it in *Tineina*, where it has been located by some other entomologists, though more commonly it is placed in *Pyralidæ*. *Hyale coryliella*, Cham., is probably *Menestra tortriciformella*, Clem., and was placed by both Dr. Clemens and myself in *Tineina*, where, I am now satisfied, it does not rightly belong.

Lord Walsingham continues: "Whether by their small size" (which we have seen fails to characterize them), "their long cilia" (which are wanting in many of the larger genera, and are not longer than in many *Tortricidæ* or *Phycidæ*), "their slender and upturned palpi" (though multitudes of them have drooping palpi or no palpi at all) "the leaf mining habits of the larvæ" (though a majority of them are not leaf miners at all, while some larvæ of *Tortricidæ*, etc., are at first), "the neuration of their wings" (differing widely among different genera as *Nepticula*, *Cuniostoma*, *Lithocolletis*, *Gelechia*, *Tinea*, etc., and in some of the higher genera differing little or not at all from that of *Tortricidæ*, *Pyralidæ*) "and ornamentation of their wings" (ranging from the brilliancy of *Lithocolletis* and *Lithaciopteryx* to the somber dullness of many *Tineidæ*), "there is in each genus associated with the Linnean name '*Tinea*' some peculiarity by which its members can without difficulty be recognized as possessing what I think may be properly called a family resemblance." It may be so, but I fail to detect the family resemblance of a *Phyllocnitis* on the one hand, and a *Tinea* or *Euplocamus* on the other, more easily than I can that between *Anophora* and many *Noctuidæ*, and when we come to trace their life histories and compare their larvæ, the attempt fails more completely still. All are LEPIDOPTERA HETEROCERA; to that extent there is resemblance, but that is about all that I find between numerous genera usually "associated with the Linnean name *Tinea*;" and I do not find as characterising the

so-called group *Tineina* any characteristic, or combination of characteristics, which I can "grasp" as constituting it a family or group of families. It appears to me to be a purely arbitrary and heterogeneous assemblage of families differing as widely from each other as they do from *Noctuidæ*, *Phycidæ*, etc. In size and form and neuration, and other respects, they grade up from the smallest and lowest, passing as gradually into the higher groups *Tortricidæ*, etc., as the latter do in these respects into families still higher in the scale. And although by using the termination "idæ" instead of "ina" we secure a "termination uniform with *Sphingdæ*, *Bombycidæ*," etc., we do not secure a "family" of equal value with those families, but only a large heterogenous group composed of numerous families (*Gelechidæ*, *Tineidæ* restricted, etc.,) the value of which is at present unproved.

It appears to me most probable that the small size, long cilia, etc., of such genera as have these characteristics are the results of degradation, not from a common form, but from a variety of originals, and in different directions; that the student will be greatly aided, to say the least, by a study of their early stages and development, and that this course is most likely to give us the key to their relationship—that is, to their natural classification. Such study, so far as I have prosecuted it, tends to the conclusion that instead of being a natural group of related families it contains at least five distinct families, degraded from as many distinct originals, and perhaps less related to each other than they are to some of the higher groups.

With great deference, therefore, for the opinions of so distinguished an entomologist as Lord Walsingham (and, no doubt, of many others), I am compelled to differ with him as to many statements in his interesting paper in PAPILIO, and I avail myself of this opportunity to state my own views more explicitly than I have elsewhere done. I will add that I have somewhere (I cannot now give the citation) seen some remarks by Mr. Stainton upon this subject, in which, as I remember, after briefly mentioning most of the characteristics of the supposed group alluded to by Lord Walsingham as above quoted, he concludes that the ciliation of the wings affords the best criterion, but admits that that fails sometimes. I think it is only a mark of degradation, and occurs just about in proportion as the species is more or less degraded, and does not indicate relationship.

NOTES ON PAPILIO OREGONIA.—*EDW.*

BY R. H. STRETCH.

During my recent trip to Washington Territory with Dr. Hagen I was fortunate enough, in conjunction with Mr. S. Henshaw, of the Boston Natural History Society, to take some

seventy-five specimens of this insect (which are in the hands of Dr. Hagen, of Cambridge) and to raise it from the larva.

We first saw the butterfly on the wing at Umatilla, Oregon, on the south bank of the Columbia River, June 24th, capturing thirty-six specimens from flowers of a species of evening primrose or fluttering round a species of *Artemisia*. On the north bank of the river, being then in Washington Territory, we took as many more on June 26th, from thistle heads, and I saw a female deposit one egg on *Artemisa*. On July 4th, Mr. Henshaw found one half-grown larva on *Daucus*, at Nelson's, about ten miles north of Yakima City, and July 5th I found another, preparing to pupate on *Artemisia*; but not the same species of plant on which I saw the egg laid. I was successful in raising a very fine example from this larva. On July 16th and 18th the butterfly was either seen or captured on the Yakima River, about half way to its junction with the Columbia, but it was quite rare. When at Spokane Falls I saw a number of specimens collected by Mr. Ricksecker. These localities show a wide range. They are all on the great basaltic plateau which occupies the central portion of the Territory and is essentially the home of the *Artemisias*.

The species is probably single brooded in this area.

Description of the Larva.—Length about two inches. Horn orange-yellow, bifurcate.

Entire larva pale yellowish-green, inclining to bluish round the transverse markings and on the ventral parts.

Head with two vertical, frontal black lines, divergent at their lower ends, and a lateral vertical black line, with a black dot between each of the lines just above the mouth parts.

Second segment with two transverse black lines, each with a terminal black dot laterally, and at the horn opening a slender transverse black line with three heavier longitudinal branches, like the top of the capital letter T. A lateral flat dull yellow tubercle.

Third, a strong black transverse velvety black line, evenly cut behind, with four indentations in front, each filled with a yellow tubercle, with a black spot low down laterally, supplemented above with a yellow tubercle. Posterior suture black.

Segments four to twelve alike, except that the black markings gradually diminished in strength posteriorly; sutures black when the larva is extended. The yellow tubercles indenting the black transverse line on segment three cut it up into five transverse black spots, the lateral one on segment four being large, the other similar ones smaller, linear and oblique; below these is a third yellow tubercle, followed by a linear black spot, so that each of these segments has a transverse series of seven black spots, the dorsal one the largest, between which are three lateral rows of yellow tubercles.

Thirteenth segment with a similar row of black dots and a terminal black line.

All the legs green, with black tips and a black dot at the base of each.

Compared with the larva of *Papilio machaon* given in the *Butterflies of North America*, the only apparent difference is that whereas in Mr. Edwards' figure the transverse black lines are continuous and partially enclose the yellow tubercles, in the larva just described the tubercles on all the segments back of the third, break up the transverse line into a series of black spots. Unfortunately, the immature larva captured by Mr. Henshaw escaped a few hours later, and before I found the second example, but it was apparently identical.

The particular larva raised had a hard time of it. It attached itself to pupate and spun its band; but the jolting of the wagon detached it, and it was found at the bottom of the box. I glued the anal segment down and supplied an artificial band. This experiment was successful, but when the pupa emerged, July 11th, it of course fell to the bottom of the box, having no silken attachment to seize. I again glued the pupa down when it showed signs of emergence, supplying the band, and in spite of all accidents secured a magnificent female imago, on July 25th. Unfortunately, I could not make a drawing of the pupa, which was green, shaded with yellow; the green obtained most strongly on those parts which correspond to the black markings of the imago, and the yellow to the yellow markings, there being two broad mottled yellowish stripes on the side of the abdomen above. The wing cases were grayish green, having a striated look. The right hand figure of the pupa of *Machaon* in Edwards' *Butt. N. Am.*, gives a good idea of the pupa if green and yellow be substituted for the shades of brown. The colors changed but little at maturity.

San Francisco, August 8, 1882.

NOTES ON LEPIDOPTERA.

COLORADIA PANDORA, Blake.—I caught to-day a very fine ♀ example of this rare and interesting moth at Soda Springs, Shasta Co. I think such a capture worthy of record, as few examples of this species are known to exist in collections. JAS. BEHRENS, San Francisco, August 22, 1882.

PAPILIO POLYDAMAS IN FLORIDA.—"I have previously thought that this species had been erroneously introduced into our lists, and I had struck it out of my revised synopsis, but to-day I received a specimen from Dr. Wittfield, of Indian River, who has taken several examples. Hitherto it has been regarded as belonging to the United States, on the authortiy of Bois. Lec, but of late its occurrence has been discredited. These authors give the food plant as a species of *Aristolochia*. I hope yet to obtain the eggs, through the energy of Dr. Wittfield. W. H. EDWARDS, Coalburgh, June 25, 1882.

NOTE ON THE GENUS HERRICHIA.—This term, which I have proposed and limited on page 64 of my new Check List, is, I found too late to make the correction, previously used by Dr. Staudinger. I beg those who use the list to alter the name to *Euherrichia*. A. R. GROTE.

EUEDWARDSIA, n. g.—Tibiæ unarmed; eyes naked, somewhat narrow. Vestiture hairy; front with a clypeal protuberance below a shallow indentation. Wings entire, produced at apices; rather short and broad. Forewings with the costa somewhat depressed; apices produced; outer margin rounded. Color, shades of yellow or orange. Type *E. Neumoegeni*, Hy. Edw. Belongs to the *Heliothinæ*. A. R. GROTE.

PAPILIO ALBANUS, Feld.—This is a common form of *P. Eurymedon* Bdv., and hardly to be distinguished from the type. It differs in having the primaries "slightly more protracted at the apex, the secondaries being more widened in the anal region, by their longer and much narrower tail, the vittæ being broader on both sides, and by the marginal spots approaching nearer to the margin. We collected two ♂. *Felder, Reise Novara.*" The ♂ ♂ taken in the mountains, or at an elevation of 2000 feet, are nearly always of this form, the ground color of the wings being also more clearly white, and the insect generally a little smaller. HY. EDWARDS.

NOTICE TO SUBSCRIBERS.

Owing to the length and importance of some papers in the present number, many matters have been held over, among which are several book notices, including one on Mr. A. R. Grote's "NEW CHECK LIST OF MOTHS," which is now ready for distribution.

PAPILIO.

Organ of the New York Entomological Club.

Vol. 2.] October, 1882. [No. 8.

DESCRIPTIONS OF NEW SPECIES OF N. AM. HETEROCERA.

By Henry Edwards.

FAM. ÆGERIADÆ.

ÆGERIA CANDESCENS. n. sp.

Fore wings purplish-brown, with a transparent median streak as far as the cell, edged on the internal margin with whitish. The discal mark purplish-brown, edged outwardly with orange-red. Transparent space behind the cell very small, reduced to four narrow streaks. Fringe golden brown. Hind wings with the margin rather broad, purple brown. Head blackish-brown, collar, palpi and orbits of eyes clear white. Thorax and abdomen blackish-brown, the latter with the segments all rather broadly edged with greenish-white. Caudal tuft wholly black. Fore wings beneath with golden lustre, and the discal mark bright orange, shading into purplish-brown on margin. Hind wings as on upper side. Fore coxæ white outwardly, the rest of the legs blackish-brown, with golden scales, the tarsi narrowly banded with black.

Exp. wings, 15 m. m.

1 ♂ Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

PYRRHOTÆNIA BEHRENSII. n. sp.

Fore wings entirely opaque, rich golden-green, purplish-brown posteriorly, with the internal margin broadly orange-red, narrowing in width towards the internal angle. The hind wings are also stained with orange-red along the abdominal margin. They are perfectly transparent, the outer portion of the margin and the fringe golden-brown. Beneath, the fore wings are rich purplish-brown, with the base and about half of the costal and internal margins orange-red. The hind wings have a golden reflec-

tion, with the costal and abdominal margins orange-red. Head brown-black, as are also the antennæ. The palpi, collar, orbits of the eyes are orange. Thorax bronze-green, with a narrow stripe on each side above, and the whole of the lower side orange-red. Abdomen also bronze-green above for the three basal segments, the sides and lower surface of these being bright orange-red. The posterior segments are all orange-red, above and below. Caudal tuft orange-red, black at the sides. The fore coxæ, middle tibiæ and a band on the hind tibiæ are bright orange, remainder of legs bronze-black.

Exp. wings, 20 m. m.

2 ♂ Soda Springs, Shasta Co., Calif. (J. Behrens.)

One of these examples has the 4th, 5th and 6th abdominal segments a pale buff instead of orange, but I think this an accidental variation. I dedicate this exquisite species to my old friend, Mr. James Behrens, who has done so much towards an investigation of the entomological fauna of California.

FAM. ZYGÆNIDÆ.

LYCOMORPHA RATA. n. sp.

Allied to *L. constans*, Hy. Edw., but differing by the following characters. The disc of the wing in the present species is dull orange, with the costa black, widening a little towards the apex, and joining the rather broad posterior marginal band. Secondaries also broadly margined with black. Head, antennæ, thorax, legs and abdomen, above and below, blue-black. Collar, patagia and sides of abdomen dull orange. Lower side of the wings same as the upper.

In *L. constans* the costa of primaries is orange, as well as the basal ⅔ of the wing; the costa *only* of the secondaries is orange, and the abdomen is wholly blue-black.

Exp. wings, 18 m. m.

Four examples. Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

LYCOMORPHA LATERCULA. n. sp.

Primaries brick red. Posterior margin broadly, internal margin narrowly, and apical 3d of costa blue-black. Secondaries blue-black, except the costal edge, which is brick-red. Under side the same as the upper. Antennæ, head, thorax and abdomen wholly blue-black. Legs with a brownish shade.

Exp. wings, 20 m. m.

Three examples. Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

FAM. BOMBYCIDÆ.

PSEUDOPSYCHE. n. genus.

Antennæ plumose, the setæ few, rather long, and bifurcate at their tips. Thorax short and broad with the vestiture squa-

mose. Abdomen shorter than the hind wings, broad at the base and becoming abruptly pointed. Fore wings much produced at the apex, wider than the hind pair, which are rounded on the anal angle, and produced at the apex. Tibiæ unarmed, but clothed with rather long spreading hairs.

PSEUDOPSYCHE EXIGUA. n. sp.

Wholly brassy black, the scales of the primaries with somewhat metallic points.

Exp. wings, 13 m. m. Length of body, 4 m. m. 2 ♂. San Francisco Mts., Arizona.

A singular little insect, difficult to refer to any known family. I believe, however, that I am right in placing it in the *Psychidæ*, but this cannot be established until the ♀ is known, and some observations have been made upon its life-history.

CLISIOCAMPA INCURVA. n. sp.

It is rather a hazardous experiment to describe a species of this genus, without a knowledge of the preparatory stages, but in the present form I find some characters, which, after a careful comparison with the types of the described Pacific Coast species, (all of which are contained in my collection,) entitle it, I believe, to a specific rank. It is most nearly allied to *C. erosa*, Stretch, and *C. fragilis*, Stretch, but differs abundantly from both. The ground color of the ♂ is pale fawn color, of the ♀, a darker shade, inclining to a brownish tint. The basal space in both sexes is paler than the rest of the wing. The strongest character is afforded by the anterior line, which is curved, and starting from costa about 4 m. m. along its edge from the base, turns below in the middle, and *passes quite into the base of the wing* on the internal margin. In all the other N. Amer. sp. there is a space on the internal margin between the junction of this line and the base of the wing, and I believe it is in the position and shape of the two lines of the primaries that the best characters for separating the species in the imago state may be found. The outer band in the present form is more regular, bent a little outwardly in the middle, and in the ♀ slightly dentate, the anterior band being without teeth in both sexes. In this respect it approaches *C. fragilis*, but in the Nevada species there is a space between the junction of the anterior line, and the base of the wing, while the ♂ is totally different. (See "PAPILIO" Vol. I., p. 64). I have no doubt of the validity of *C. incurva* as a species, but, where it is possible, the most careful attention should be given to the species of this genus in their earlier stages.

Exp. wings, ♂ 28 m. m. ♀ 34 m. m.

1 ♂ 1 ♀ Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

ŒDEMASIA PERANGULATA. n. sp.

Primaries greyish white, with a fawn-colored shade along the internal margin, especially towards the base of the wing. The anterior lines are obsolete, the posterior is broken on the costa, but

its course may be traced by a series of imperfect streaks, nearly to the posterior margin, thence about the middle of the wing it forms a very acute angle to the centre of the internal margin and is slightly dentate outwardly. There is a conspicuous discal mark, some streaks near the apex of the costa, and others near the internal angle, blackish-brown, fringe fawn color. Secondaries, sordid white, with a blackish blotch on anal angle, and the fringes and margin dusky. Beneath, the wings are sordid white, shading into dusky on the costa, the primaries broadly so, and enclosing some blackish streaks. Antennæ fawn color. Thorax brownish fawn color, mottled with darker shade, the collar brown-black. Abdomen sordid white, shading into fawn-color at the base. Legs fawn color, mottled with brownish.

Exp. wings, 38 m. m.

1 ♂ Colorado. Coll. Hy. Edwards.

COSSUS MUCIDUS. n. sp.

Size small. Primaries grayish-brown, mottled with darker shades, the margins being broadly pale, and of a purer gray tint. Reaching from the base to the cell on the costal half of the wing is a conspicuous whitish shade, the whole of the wing flecked with greyish and brown atoms. Fringe alternately brown and sordid white. Secondaries dusky white, mottled with brown. Thorax and abdomen concolorous. Beneath, the primaries are mottled with brown on a dusky ground, and the secondaries are as on the upper side. Abdomen considerably longer than the lower wings in both sexes. In the ♂, there are indications of brown rings at the junction of the segments.

Exp. wings, ♂ 36 m. m. ♀ 40 m. m.

Length of body, ♂ 20 m. m. ♀ 25 m. m.

2 examples. Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

EUCHÆTES PUDENS. n. sp.

Closely allied to *E. collaris*, but considerably smaller. Clear white, with the costa pale buff for about one-third of its length; the collar also buff, this color being by no means extended to the thorax, as it is in *E. collaris*. Abdomen yellowish-white, with the abdominal spots very small and indistinct, being reduced to mere points. Fore legs only slightly stained with buff.

Exp. wings, 28 m. m.

1 ♂. S. W. Texas. (I. Boll.) Coll. B. Neumoegen.

I have examined a large number of *E. collaris*, and compared them with the present specimen. In all I find the costa yellow almost to the apex, and the tegulæ and upper half of the thorax well marked with the same color, neither of which characters obtains in the present form.

FAM. NOCTUIDÆ.

STIBADIUM AUREOLUM. n. sp.

Smaller and more delicate than *S. spumosum*. The anterior

two-thirds of primaries are pinkish-brown, with fleckings of whitish scales. The t. p. line is whitish, bent in a sharp angle on costa, thence oblique to internal margin. Behind this is an oblique broad yellow stripe, with a golden sheen, edged posteriorly by a pinkish-brown sub-marginal band, the apex of the wing being occupied by the yellow streak. Fringe brown, speckled with white. Secondaries dull fawn color, palest at base, with an indistinct median line. Fringe stone color. Beneath, the primaries are dusky, the yellow oblique stripes of the upper side being faintly shown. Costa with a golden sheen. Secondaries wholly pale fawn color. Thorax and abdomen concolorous.

Exp. wings, 28 m. m. Length of body, 13 m. m.

Four examples. Prescott, Arizona. (I. Doll.) Coll. B. Neumoegen.

PLUSIA SCAPULARIS. n. sp.

Primaries bright fawn color, with some golden shades near the internal angle. From near the apex a bright chestnut-brown shade extends to the internal margin, and a large blotch of the same color rests on the middle of the internal margin, enclosing the entire scapula-shaped silver spot, the dark shade not reaching to the costa. The lines are very faintly indicated, the t. a. being most apparent, and shown by a little darker shade than the ground color of the wing. Secondaries fawn-color, with darker shading outwardly. Under side of wings yellowish fawn color, the primaries with dusky shade. Thorax and abdomen concolorous.

Exp. wings, 36 m. m. Three examples.

Washington Ter. (H. K. Morrison.) Coll. Hy. Edwards and B. Neumoegen.

PLUSIA ACCURATA. n. sp.

Primaries with the ground color, pale fawn, with a large chestnut-brown blotch in the disc of the wing, and another on the posterior margin, giving it a mottled appearance. Basal half-line and t. a. line both well marked, and shaded inwardly with chestnut-brown. The t. p. line is slightly bent on the costa, then oblique to internal margin. Reniform and sub-reniform united, and forming a bent whitish band reaching to costa, and enclosing a bright chestnut-brown triangular blotch. Below the reniform is a large chestnut blotch, shading into fawn color on the internal margin, and immediately behind the reniform is a pale shade interrupted by the t. p. line. The sub-marginal line is distinct at the apex for about 3 m. m., then lost in a bright chestnut-brown cloud, reappearing in a dentated form near the internal angle. Marginal space chestnut-brown. Secondaries whitish, shaded with pale brown. Fringe white. Lower side of primaries pale fawn color, with the t. p. and sub-marginal lines faintly indicated. Secondaries wholly dull white, with a brownish tinge. Thorax and abdomen concolorous above and below.

Exp. wings, 33 m. m.

1 ♀. Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

The absence of thoracic and abdominal tufts may place this species in another genus than *Plusia*, but as its nearest generic ally is unknown to me, I describe it provisionally here. In its system of coloration it reminds us somewhat of *P. consona* of Europe.

LYGRANTHOECIA CONSTRICTA. n. sp.

Dark brown on primaries. On costa and internal margin a distinct white double line, enclosing a space, so constricted and interrupted in the middle of the wing, as to form a double triangle, the bases of which rest on the costa and internal margin. The spaces enclosed by these lines are rather paler than the general color. Posterior margins broadly brownish grey. Secondaries dusky with paler central shade, and dark discal spot. Beneath, wholly dusky, with paler shades, and discal spots distinctly dark brown.

Exp. wings, 28 m. m. Length of body, 14 m. m.

1 ♂ N. Carolina. (H. K. Morrison.) Coll. B. Neumoegen.

ACOPA INCANA. n. sp.

Ground color cream white, the primaries covered with brownish atoms, giving the surface a hoary appearance. There is in one example a whitish streak along internal margin, and again near the costa, but in another, these disappear, and the whole surface is powdered with brown scales. At the end of the cell is a cuneate brown mark, and the margins are also deep brown, with the fringes white. The secondaries are pale dusky, with whitish central shades, and a faint sublunate discal mark. Beneath the wings are wholly sordid white, with dusky shades, and faint discal marks.

2 ♀ Arizona. (I. Doll.) Coll. B. Neumoegen.

Exp. wings, 30 m. m. Length of body, 12 m. m.

EUBOLINA MESKEI. n. sp.

Rich bluish brown, the primaries with numbers of small bluish scales scattered over the surface; the lines all strongly marked and deeply dentated outwardly, the t. p. enclosing a large whitish discal subovate patch, covering the reniform and subreniform spaces. The apical angle bears a bluish iridescent eye-like mark, enclosed by a sinuate white line. There are also some white triangular marks along the apical portion of the costa. Secondaries ochreous brown, with darker sub-marginal waved bands. A paler streak beyond the margin, and the fringe pale. Thorax concolorous with the primaries, abdomen concolorous with the secondaries. Beneath ochreous, with brown waved lines, the margins darker brown. An ochreous crescent near apex of primaries and some small ochreous patches along the costa. The t. p. line is distinct, bent outwardly at the middle. The reniform shows as a brown cloud. The lines on secondaries

are double, and in two series across the middle of the wing. The margins are broadly clouded with brown, and there is an ochreous streak on the apex, narrowing towards the centre of the wing. Abdomen and thorax wholly ochreous.

Exp. wings, 32 m. m. Length of body, 18 m. m.

1 ♂ Texas. Coll. O. Meske, to whom I regardfully dedicate the species.

This curious insect, in the ornamentation of the lower side, reminds us of the Australian genus *Praxis*. *Guen. Sp. Genrl. Noctuelites. Pl.* 18, *fig.* 10.

SYNEDOIDA CERVINA. n. sp.

Primaries fawn color, with a darker, slightly dentated median line, and a second line on the costa, ceasing at the median nervule. There are indications of a faint discal mark in the cell, and some scattered brown scales, along the costal margin and at the base of the wing. The posterior margin has eight black points, and the fringe is brown and fawn color alternately. Secondaries fawn-drab, paler than the primaries, darkest on the outer margin Thorax and abdomen concolorous above and below.

Exp. wings, 37 m. m.

1 ♀. Arizona. (H. K. Morrison.) Coll. B. Neumoegen.

I am inclined to think that this species and *S. inepta*, Hy. Edw., may form the types of a new genus. They are aberrant in their system of coloration, and the thorax and abdomen are stouter and heavier than in *S. scrupulosa* and allies.

FAM. DELTOIDÆ.

ANTIBLEMMA GUTTULA. n. sp.

A singular species, darker in color than *A. canalis*, the general shade being a dull chocolate brown. The lines are indistinct, except the t. p. line, which is common to both wings, and is slightly paler than the ground color, oblique, and near the apex, bent in a very acute angle to the costa. The base of the primaries is mottled with black. The reniform is very large and conspicuous, bluish-white, with a black ring. Behind the acute angle of the t. p. line is a row of small black spots, edged with bluish-white scales, becoming obsolete below the middle of the wing. This broken maculate line appears also on the secondaries. The apex of the costa bears four small pinkish-orange patches, not visible without a lens. The marginal line on both wings is slightly sinuate, cupreous, edged anteriorly with black. Fringes coppery-brown. Discal spot of secondaries jet black. Lower surface has the markings repeated more forcibly. The costal margin is coppery throughout its length, and the discal spot of the secondaries is edged with bluish-white scales. The ground color is a little paler, and mottled with black scales, while

the line on both wings is more distinct and deeply dentate throughout its length.

Exp. wings, 30 m. m.

1 ♂. Georgia. Coll. Hy. Edwards.

FAM. GEOMETRIDÆ.

AZELINA ALBOMACULARIA. n. sp.

The smallest species of the genus yet known to me. The space in front of the t. p. line is brownish-fawn color, thickly sprinkled with black atoms; the posterior marginal space, dull cream color, with fewer black scales. T. a. line not reaching the costa, black, shaded inwardly with white; t. p. line also black, double on its internal half, and shaded outwardly with white, the space between, especially on the internal margin, darker than the rest of the wing. Discal spot large, conspicuous, clear white. Some small black crescents are on the extreme margin. Fringe pale fawn color. Secondaries dull cream color, with a double black, slightly dentate line at the anal angle, below which are three small black crescents. Wings slightly speckled with black scales, more especially along the abdominal margin. Thorax bright fawn color, abdomen darker, both thickly speckled with black. Beneath, the wings are wholly pale fawn color, a discal spot and waved line on secondaries blackish, both wings thickly speckled with black.

Exp. wings, 26 m. m.

2 ♂. Arizona. (H. K. Morrison). Coll. B. Neumoegen.

AZELINA ARIZONARIA. n. sp.

Ground color greyish-white, differing in this respect from any form known to me. The lines, which are brown, are almost straight, the t. a. being only slightly dentate near the internal margin. The t. p. line is slightly serrate on its outer edge. The space between these lines, as well as the basal portion of the wing, is covered with brownish irrorations, and there is a brownish cloud nearest to the internal angle. A whitish discal spot and a pale dash along the median vein. Posterior portion of the wing pale grey, fringe brownish. Margins only slightly serrate, the deepest tooth being at the termination of the median vein. Secondaries with brownish, slightly waved, double band, terminating at the anal angle in a brownish cloud. Dentation of the margins deeper than in the primaries. Beneath wholly griseous, with brown irrorations, the bands and discal spot of secondaries darker. Abdomen and thorax concolorous above and below.

Exp. wings, 34 m. m. Length of body, 15 m. m.

1 ♀. Arizona. (I. Doll). Coll. B. Neumoegen.

NEW ARIZONIAN AND TEXAN MOTHS.

By A. R. Grote, A. M.

Euchætes Zonalis. n. s.

♀. Size large; wings very dark lead color; primaries with the costa dark yellow; internal margin not striped; both wings concolorous, the narrow fringes pale, whitish. Abdomen banded with black and crimson, the latter broadest. Anal hairs whitish. Front dark; head reddish behind; thorax with lateral stripes of yellow in front; disc and tegulæ dark lead-color, immaculate. Beneath dark lead color; legs and body dark; fringes white, contrasting, as does the white anal tuft; costa dark yellow as above.

Arizona. Coll. B. Neumoegen.

Euchætes Vivida. n. s.

♂ ♀. Fore wings pale stone color, smooth, thinly scaled; costa and internal margin faintly striped with yellow; hind wings whitish. Abdomen crimson, unspotted; beneath pale gray; fore legs reddish at base. Tegulæ narrowly edged with crimson; thorax pale gray.

South Western Texas. Coll. B. Neumoegen.

Expanse 33 mil.

Euchætes Perlevis. n. s.

♀. Size small. Fore wings dark fuscous; the hind wings have a crimson patch on internal margin. Abdomen crimson. Beneath lead color, the patch on hind wings repeated. Veins marked. Wings thinly scaled. Abdomen unspotted; beneath lead color; thorax head and legs lead color.

Expanse 25 mil.

Arizona. Coll. B. Neumoegen.

Hypopta Henrici. n. s.

♂ ♀. Size of *Bertholdi*, but with the wings much broken up by white. The male, with feathered white-stemmed antennæ, is smallest and palest of the two sexes. Costa broadly striped with silvery white; with fine dark preapical costal dots. The ground is brownish fuscous with an ochery shading; hind wings dark fuscous in female, pale in male, concolorous. On fore wing the median vein is striped with silvery white; a terminal series of white block-shaped marks; vein 1 and internal margin irregularly white; fringes pale. Beneath, markings lost; fringes white, contrasting. Named for Mr. H. Edwards.

Arizona. Coll. B. Neumoegen.

Tarache Expolita. n. s.

Fore wings with the costal field, above median vein, white, traversed by the faint double yellowish lines in place of median shade and t. p. line. Anal angle and fringe again forming a white blotch, with the terminal line marked with pale yellow. Else the wing is blackish, scintillant; at the upper edge it shows,

about the middle of the wing, an olive stain. Shorter-winged than *T. angustipennis;* the hind wings stained with fuscous. Head and collar white, thorax black.

Arizona. Coll. B. Neumoegen.

NEUMOEGENIA. n. g.

Form slender; vestiture scaly; clypeus rough, with a superior arched ridge, infra-clypeal plate prominent; wings very wide, entire; apex determinate; external margin regularly rounded; labial palpi short; Legs slender and apparently unarmed; abdomen hardly exceeding secondaries, untufted. Allied apparently to *Acopa*.

NEUMOEGENIA POETICA. n. s.

White. Fringes white. A bright gold patch fills the rest of the primary interrupted by a white patch at extremity of median vein, and stretching along nervules. This golden field leaves the internal margin narrowly white; at base the field is edged outwardly obliquely by a dark reddish line. Hind wings pale smoky. Body white; thorax smoky behind. Beneath immaculate, pale smoky.

Expanse 25 mil.

Arizona. Coll. B. Neumoegen.

EUSTROTIA PROPERA. n. s.

Size very small. Looks like a *Grapholitha;* fore wings blackish to the t. p. line; beyond reddish or carneous gray like the pale tint in *Apicosa*. Reniform whitish. T. p. line black with a rather prominent exsertion, opposite the cell; the line is even. Hind wings pale fuscous.

Expanse 15 mil.

Arizona. Coll. B. Neumoegen.

FENARIA. n. genus.

Form like *Chrysauge*. Eyes naked; clypeus with an embossed protrusion; labial palpi fringed; third article small; tongue stout. Body linear; abdomen tufted at base. Fore wings rounded externally, with rounded apices. Wings full and wide; primaries with noctuiform markings; hind wings yellow, with black border.

FENARIA SEVORSA. n. s.

Fore wings ferruginous brown with a white shade beyond the cell, and a nebulous band behind t. p. line. Both stigmata paler than wing, upright, subequal, ferruginous ringed. Subterminal line dark, waved, regular and prominent; terminal field narrow, hoary. Fringes dark ferruginous. Ground color of primaries blackish, overshaded with ferruginous. Hind wings dark yellow, with an even black marginal band; fringes black. Beneath black, with a yellow oblique subterminal patch; base yellow;

hind wings as above; the yellow is paler. Body and legs blackish.

Expanse 35 mil.

Arizona. Coll. B. Neumoegen.

I regret that I cannot describe the neuration of this unique; it is one of the highest forms of the sub-family *Pyralididæ*.

SOME NEW BEAUTIES FROM VARIOUS PARTS OF ARIZONA.

By B. Neumoegen.

Euhalesidota pura. n. sp.

♂. Dark luteous. Antennæ, head, collar, thorax, primaries and abdomen concolorous. Antennæ pectinated. A small, dark-brown discal spot. Another small dark-brown spot between third median and submedian nervules, near conjunction of the two. Slight indications of brownish speckles. Interior margin dark-brownish. Secondaries creamish white, with yellowish basal tuft and brownish fringe of exterior margin. Beneath, primaries luteous, but the space between median nervules and interior margin, as well as the secondaries, creamish white, diaphanous.

Expanse, 1 5/8 inches.

Length of body, 3/8 inch.

♀ resembles the ♂, but the discal spot and brownish speckles on primaries more pronounced. Indications of two parallel, transverse brownish lines from costa, near apex, to near the inner angle of interior margin. Antennæ slightly serrated.

Expanse, 1 3/4 inches. Length of body, 3/8–1/2 inch.

Southeastern Arizona. Types Coll., B. Neumoegen.

This insect somewhat resembles H. *insularis*, H.-Sch. (which, by the way, is a *Euhalesidota*) of Cuba, but can be at once distinguished from the same by the dark luteous color of primaries.

Halesidota mixta. n. sp.

♀. Antennæ, head, collar, patagiæ and body ochraceous. Antennæ slightly serrated. Primaries ochraceous, with dark brownish speckles in the shape of irregular rings. Some of these speckles forming nearly two parallel transverse lines from costa, near apex, down to interior margin. The speckles of anterior line having an irregular triangular shape, whilst those of the anterior line are irregularly reniform. All the nervules are darkish brown.

Secondaries creamish white, with ochraceous basal tuft and diaphanous.

Beneath, primaries and secondaries creamish white. The markings of speckles on primaries partly reproduced. Secondaries diaphanous.

Expanse, 1 7/8 inches. Length of body, 5/8 inch.

Southeastern Arizona. Type Coll., B. Neumoegen.

ICHTHYURA INORNATA, n. sp.

♂. Antennæ brownish. Head, thorax and body gray. Primaries gray. A suffusion of brown near costa, fading towards median and discal nervures, leaving spaces of disc, interior margin and base in gray. Three irregular, undulating, transverse lines from costa to interior margin, the space between anterior and middle line being largest, and between middle and interior lines, near base, smallest. The interior and middle lines nearly parallel. A separate line, starting from median nervure, where the middle line intercepts it, running diagonally towards and connecting with anterior line, near interior margin, thus forming a brownish space between costa and interior margin, much in the shape of the Latin letter V. The space at the point of conjunction of anterior and separate diagonal line on interior margin, blackish-brown. The discal spot in upper middle of the V, pronounced and blackish-brown. All the transverse lines and diagonal line, whitish with brown margins; the white accentuation of anterior line near costa especially pronounced. An irregular, transverse row of brown dots in space between anterior transverse line and exterior margin.

Secondaries gray, somewhat fading towards exterior margin. Indication of a transverse whitish line in the middle of anterior down to inner margins.

Beneath, primaries brownish-gray. Indication of the transverse lines, that of the anterior line plainly marked. Secondaries gray, with indication of transverse line.

The ♀ resembles the ♂, only that the transverse row of brown dots is darker and the dots more diffused, sometimes forming streaks and connecting with anterior line.

Expanse, 1 3/8 inch. Length of body, 5/8 inch.

Southeastern Arizona. Types Coll., B. Neumoegen.

I have called this beautiful insect *inornata*, as it is readily distinguished from its relatives by its plain, unornamented thorax.

CNETHOCAMPA GRISEA. n. sp.

♀ Antennæ, head and primaries dark blackish-gray. Thorax pilose and dark gray. Antennæ serrate. Diffused markings in blackish on primaries. Three transverse, irregular undulating lines, of whitish-gray color, from costa to interior margin, the interior line near base most pronounced. The margins of transverse lines blackish-gray. Body dark gray.

Secondaries uniform dark gray with pronounced marginal fringes.

Beneath primaries and secondaries uniform dark gray.

Expanse, 1 inch; length of body, 1/4 inch. Type Coll. B. Neumoegen.

The first representative, discovered in our country, of this well-known European genus.

San Francisco Mountains, Northern Arizona.

MARMOPTERYX SEIFERTI. n. sp.

Head, thorax, body and primaries dark ochraceous, somewhat fading towards base of primaries. Marginal fringes brownish. A triangularly-shaped coffee-colored blotch, covering the space of apex and continuing as a small band along exterior margin, gradually diminishing at the junction of inner angle. A large, coffee-colored diagonal discal blotch, shaped like an irregular square, and running from costa to 2d median nervure. At base of costa a small, coffee-colored streak.

Secondaries uniform ochraceous, fading towards base, fringes brownish.

Beneath primaries ochraceous, the apical blotch and marginal band richly dressed with brown grains. Discal blotch suffused, blackish, covering space between discal nervures and base, and fading towards the latter.

Secondaries light ochraceous, richly dressed with innumerable brown grains.

♂ ♀. Prescott, Arizona. Types Coll. B. Neumoegen. Expanse, 1½ inch. Length of body, ⅜ inch.

I take great pleasure in naming this handsome geometrid after my good friend and ardent entomologist, Mr. Otto Seifert.

STIRIA SULPHUREA. n. sp.

Head, collar and primaries of bright sulphur color. Patagiæ covered with brownish dust. Fringes brownish, connected with an irregular, oval shaped, brownish blotch, resting on middle of exterior margin. A dark brown, small reniform spot on the middle of interior margin. A small brown streak at base. A faint brownish transverse undulating line from costa to junction of reniform spot on interior margin. The space included in this line covered with a few brownish dots.

Secondaries uniform grayish-brown with lighter fringes.

Beneath, primaries blackish-brown, fading into grayish-yellow near apex and exterior margin.

Secondaries uniform grayish-yellow.

♂ ♀. Expanse, 1¼ inch. Length of body, ¼ inch.

Prescott, Arizona. (I. Doll.) Coll. B. Neumoegen.

NOTE.—The above descriptions were issued in the form of an "extra," on October 7th, 1882.

DESCRIPTIONS OF NEW SPECIES OF DIURNAL LEPIDOPTERA TAKEN BY MR. H. K. MORRISON, AT FORT GRANT AND IN GRAHAM MOUNTAINS, ARIZONA, 1882.

By Wm. H. Edwards.

Melitæa Perse.

Male.—Expands 1.1 inch. Shape of M. *Dymas*, Edw. Upper side yellow-fulvous with black lines; both hind margins broadly bordered black, on which are sub-marginal fulvous spots, small and irregular in shape on primaries, sub-crescent on secondaries; anterior to these a common series of sub-quadrate spots, and another similar, elongated, the two separated by a black line on primaries and partially on secondaries; thence to bases of wings fulvous with black reticulations; fringes black, white at tips of the nervules.

Under side of primaries fulvous, the black markings repeated indistinctly; costal edge white, along hind margin a narrow buff belt, and next a series of yellow-white crescent spots. Secondaries have a similar edging to margin, and a series of large yellow-white crescents, next anterior to which is a series of spots, sometimes small and rounded, orange, on a whitish ground, sometimes wholly orange; above these a narrow buff belt, a black line and a white band, bisected with black next costal margin; thence to base orange, with a white spot edged black in cell, a cross band of four white spots, an orange band, a white band on shoulder, the tip of the shoulder buff.

Body above fuscous, the abdomen on sides fulvous, beneath both abdomen and thorax yellow-white; legs fulvous, the femora white on under side; palpi fulvous, white at base; antennæ black annulated white; club black, ferruginous at tip, white beneath.

Female.—Expands 1.3 inch. Similar to the male, the fulvous more diffused. Under side as in the male.

From 3 ♂ 3 ♀. This species belongs to the same sub-group with M. *Dymas*, Edw., the fore wings being elongated and narnow. *Dymas* was described from San Antonio, Texas.

Lemonias Ares.

Male.—Expands 1.3 inch. Upper side of primaries brown, with a very faint reddish tinge beyond disk to margins; of secondaries fulvous over costal half of the wing, the remainder, to inner margin, brown; primaries have an obsolescent marginal and extra-discal row of dark points; a demi-row of black spots from costa to second branch of median, at end of cell; a row of similar spots a little nearer base quite across the wing, and three indistinct transverse rows from middle of cell to base. Secondaries have a sub-marginal row of black points, an extra-discal row of small spots, a demi-row on disk, and others nearer base; fringes of primaries brown, a little white in the median

interspaces; of secondaries white, cut with brown at the ends of the nervules.

Under side ferruginous, the apical and costal area of primaries, and all of secondaries, dusted with whitish scales, giving a gray surface; rest of primaries fulvous; the black spots on the fulvous area repeated, but elsewhere either indistinct or wanting: on secondaries a row of fine points crosses the disk, but faint; the black spots not repeated.

Female.—Expands 1.6 inch. Upper side as in male, the two outer rows of spots on primaries distinct, the marginal being rounded, and with a little fulvous on the outer side of each. On the under side there is less gray, and the spots of both wings are repeated, reduced.

From 2 ♂ 1 ♀.

LEMONIAS CLEIS.

Male.—Expands 1.6 inch. Upper side yellow or dead-leaf-brown; primaries have a sub-marginal row of indistinct dark points; an extra-discal row of crescent black spots; a demi-row at end of cell, forming a crenated line, on the basal side of which the ground is suffused with black; three rows between middle of cell and base. Secondaries fulvous, over brown ground on inner half the wing; near hind margin a row of small rounded black spots, an extra-discal row of crenated black spots, a zigzag row of crenated spots across disk, and other rows to base, much as in primaries; fringes dusky, with a little white in the median interspaces and near apex; of secondaries whitish, with brown at the ends of the nervules.

Under side pale ferruginous, the spots indistinctly repeated in faint brown marks and points, except in inner margin of primaries, where they are black.

Female.—Same size. Upper side nearly as in the male, the black area on costa of primaries more conspicuous. Under side as in the male.

From 1 ♂ 1 ♀.

These two species *Ares* and *Cleis* belong to a group hitherto unrepresented in our fauna, the fore wings being long and pointed, more triangular in shape than the *Mormo* group.

THECLA APAMA.

Male.—Expands about 1.1 inch. Allied to *Dumetorum* Bd. but marked on under side like *Castalis* Edw.; tailless.

Upper side blackish-brown: primaries have an oval black stigma; fringes ashy-brown, near anal angle white next the margin, the tip of the hairs brown, at the angle black.

Under side of primaries yellow-brown, washed with golden green over apical area and on costal margin; on the disk a transverse row of small spots confluent from costa to second median interspace: these spots are made up of slender black marks, edged outside by white, inside by brown or russet. Secondaries have a

discal row of similar but separated spots, those on costal half of wing crescent, the others serrated, the row somewhat irregular; at anal angle the margin is edged white over the black fringe.

Female.—Same size; the disks russet.

Several examples of this species were received. I had it formerly also from the Wheeler Expedition.

PAMPHILA DEVA. *Edw.* Trans. Am. Ent. Soc. V. 292, 1876.

Male.—Expands 1.4 to 1.8 inch. Upper side dark brown, with a bronze reflection; primaries have three small semi-translucent white spots on costa near apex, a large rhomboidal spot at end of cell, with an angular sinus on either side, a small spot at origin of upper median interspace, and a large sub-rectangular spot in second median interspace—these, with the cellular spot, making a triangle; secondaries immaculate; fringes of primaries brownish-cinereous, lightest next inner angle; of secondaries, whitish throughout.

Under side brown; the apex, costal margin of primaries and all of secondaries dusted with gray scales; the spots repeated; in addition, secondaries have a brown dash on middle of disk, transverse, and within this a white streak.

The foregoing description is taken from one male, another has the spots all small; on under side of secondaries the brown dash is without the white streak.

Female.—Expands about 2 inches. Same color and markings as the male on both sides; the black dash is present, but the white streak is wanting in all the examples under view.

From 2 ♂ 4 ♀.

Deva was originally described from a single female received from the Wheeler Expedition 1875 or 1876, and up to the present time this and another female taken by Mr. Neumoegen, in 1880, have been the only representatives of the species known to me in collections.

PAMPHILA PITTACUS.

Male.—Expands 1.5 inch. Upper side pale brown, thickly dusted with greenish-gray scales over whole surface; both wings have semi-transparent spots; on primaries three sub-apical on costa, three in oblique line across the median interspaces; a large spot at end of cell, rhomboidal or rectangular, constricted across the middle. Secondaries have a straight transverse row on middle of disk, four spots nearly confluent; fringes cinereous.

Under side brown; apex and costa of primaries and all of secondaries hoary with whitish scales; the spots repeated; a whitish point near outer angle of secondaries, another near base in same interspace, and a third in sub-median interspace near base. These all obscure.

Female.—Same size. Upper side similar to the male; on secondaries in the example under view the band on secondaries

is wanting, except the outermost spot; and on the under side there is the same difference.

From 3 ♂ 1 ♀.

PAMPHILA PYTHON.

Female.—Expands 1.6 inch. Upper side brown, thickly dusted with yellow-fulvous scales; primaries have three small sub-apical spots on costa, a sub-rhomboidal spot at end of cell, and three spots in oblique line; all yellowish, semi-translucent. Secondaries have two small yellow spots near outer angle, perpendicular to the margin; fringes of primaries white, with brown at the ends of the nervules, of secondaries white.

Under side brown; secondaries covered with gray scales, and primaries on apical area; the spots of primaries repeated; secondaries have two small white patches in sub-costal interspace, one near origin, the other at outer angle, and a bent row of five small white spots on the disk; there is also a small patch at origin of sub-median interspace. From 1 ♀.

PAMPHILA NEREUS. *Edw.* ♂. Trans. A. E. Soc. 5, 207, 1876.

This species was described from a single male received from the Wheeler Expedition, and taken in South Apache, Arizona.

Mr. Morrison sends me several fine examples. As there is some variation from the description, and the present examples are in perfect condition, while the insects collected by the Wheeler Expedition never were in such condition, I reprint an amended description.

Male.—Expands about 1.1 inch. Upper side dark brown with a greenish gloss; primaries have a transverse band of small white spots, four of them on costal margin, in a line slightly concave outwards; the others form an oblique line with these to middle of inner margin; in some examples the band is broken by the absence of the spot opposite cell; fringes long, cinereous.

Under side of primaries dark brown on disk to inner margin and base; the apical area half way down hind margin, and the costal margin thickly dusted with gray-yellow scales; the spots repeated. Secondaries entirely covered with gray-yellow; a little beyond the disk an irregular row of small indistinct whitish spots nearly parallel to hind margin, and curving around outer angle and along costal margin; a spot in cell.

Female.—Same size. Upper side dark brown, the spots less conspicuous than in the male. Under side as in the male.

PHOLISORA ALPHEUS. *Edw.* Trans. A. E. Soc. 5, 186, 1876.

This species was described from two males taken in New Mexico in 1875, and the presence of fresh examples causes me to amend the description.

Male.—Expands from 1.1 to 1.2 inches. Upper side of primaries gray-brown, of secondaries black brown; primaries have a series of black dashes in the interspaces beyond the disk from costa to inner margin, and a second transverse row of in-

distinct black patches nearer base; along hind margin are rounded blackish spots, not well defined; on costal margin two or three sub-apical white dots, and another in lower median interspace, not always present; fringes of primaries brown with a few white hairs at the ends of the nervules; at the apex a clear white space; of secondaries wholly brown.

Under side dark brown, the apex and hind margin of primaries and all of secondaries dusted with white scales; the spots repeated. Secondaries have an indistinct sub-marginal row of small whitish patches, two or three similar patches across the disk, and one in cell; but in some examples all these marks are nearly or quite wanting.

Female.—Same size. In general like the male, but at the outer ends of the black dashes on primaries are whitish scales, and on secondaries is an extra discal series of whitish patches, small, and sometimes composed of a few scales only. On the under side both wings have a sub-marginal series of whitish points; under the sub-apical white spots, is a white dot in each of the median interspaces, and a white streak across end of cell on secondaries.

From 4 ♂ 2 ♀.

PHOLISORA CEOS.

Male.—Expands 1.15 inch. Upper side black-brown, with a few scattered whitish scales, an indistinct band, scarcely differing from the ground, along hind margin of primaries, and a similar one sub-marginal; two white dots on costa near apex; fringes concolored. Under side nearly same shade as above, the white dots sometimes repeated, sometimes not; near anal angle of secondaries two gray dots across sub-median interspace. Body black-brown above; abdomen black beneath; thorax white; palpi white, on upper side ferruginous, and the hairs between the eyes and on back of head and front of thorax, all ferruginous; antennæ black; club black, gray beneath.

Female.—Same size. Precisely like the male, except that there are three white dots on primaries instead of two in the examples under view.

From 2 ♂ ♀. This species is readily distinguished by the ferruginous covering to head and front of thorax.

EUDAMUS DORUS.

Secondaries much produced at anal angle.

Male.—Expands 1.6 inch. Upper side dark brown, with many whitish semi-transparent spots; primaries have three small sub-apical spots on costa, a dot just below these, towards hind margin; three large spots in the median and sub-median interspaces, in a line parallel to hind margin; a small spot near middle of costa, a large patch under this, in cell, and a large sub-rectangular spot at origin of lower median interspace; secondaries clothed with long, dark-gray hairs, across disk a line of four whitish spots;

fringes of primaries dark cinereous, alternating with brown; of secondaries light cinereous, but next anal angle brown.

Under side brown, the inner margin of primaries yellowish; the spots repeated, enlarged, and more or less confluent on primaries. On secondaries the spots are much dusted with brown scales; both wings much covered with whitish or bluish-white scales, especially dense on apical area of primaries and over outer limb of secondaries, but nearly as dense at base of these last; secondaries have two blackish transverse narrow bands, the outer one in line with the spots, the other half way from this to base, and the two are connected by a broad ligament of same color on under side of cell; near base three small brown patches.

Body above brown, underneath gray-brown; legs brown, annulated white; palpi white with many gray hairs on upper part; antennæ black, annulated on under side with white; club deep ferruginous, white on under side.

Female.—Expands 1.7 inch. Like the male; the spots rather larger.

From 2 ♂ 2 ♀.

EUDAMUS EPIGENA. *Butler*. Trans. Ent. Soc. Lond. 4, 493, 1870, Id. Lep. Exot., p. 65, pl. 25, fig. 6.

Male.—Expands about two inches. Upper side blackish-brown, marked by nine small semi-transparent spots; of these three are sub-apical on costa; three form an oblique line, to which a fourth is at right angles, in sub-median interspace, two on middle of costal margin; fringes of primaries white at inner angle; dusky-white to apex, with brown at the tips of the nervules; of secondaries white, with a few short brown hairs at tips of the nervules.

Under side of primaries brown, dusted with white narrowly along hind margins; the spots repeated; secondaries dark brown, crossed by two black bands, of irregular outlines; the hind margin broadly bordered white, on which are brown reticulations.

Female.—Expands about 2.1 inch. Similar to the male. In one example under view several of the spots are wanting.

From 3 ♂ 3 ♀.

I re-describe this species, as it is described and figured in works not accessible to most American lepidopterists. I formerly received a female of *Epigena* from Texas, through kindness of Mr. Otto Meske, and it has remained an unique in my collection till now.

EUDAMUS MOSCHUS.

Male.—Expands from 1.3 to 1.7 inch. Upper side very like *Hippalus. Edw.* (PAPILIO, 2, 27). Glossy brown, with nine whitish, semi-transparent spots on primaries, of which four are sub-apical on costa, three across discoidal and median interspaces, in an oblique line, one in cell and another above this; these spots are all small, and those in cell and lower median

interspace are much smaller than in *Hippalus;* fringes of primaries whity-brown, darker at the ends of the nervules; of secondaries white, except at outer angle; there as in primaries.

Under side of both wings brown, mottled with dashes about apex of primaries, and crossed by two black bands, and a demi-band on secondaries; in some examples the disk and base of secondaries is nearly as dark as the bands, and the margin is gray, but usually the contrast is decided between the ground and bands; the spots of primaries repeated.

Body above dark brown, beneath thorax gray-brown; abdomen same (in some cases light, with a dark ventral line); legs yellow-brown; palpi yellowish, with brown hairs; antennæ black above, luteous beneath; club black above, yellow beneath; the tip ferruginous.

Female.—Expands about 2 inches. Similar to the male.

From 6♂ 6♀.

PYRRHOPYGA ARAXES. *Hewitson.* Descr. Hesp. 2, No. 3, 1867.

Male.—Expands about 2.1 inches. Upper side brown, dark along both hind margins; primaries have ten semi-translucent yellow spots; of these 3 form a curved row on costa near apex, and a 4th is near these on basal side; 3 make a band on the discoidal and upper median interspaces, and 3 on end of cell and interspaces below; secondaries immaculate; fringes alternately black and white.

Under side of both wings yellow-ochre, except on outer half of primaries and along the hind margin of secondaries; the spots repeated.

Body above brown, the rings of abdomen on sides, and the entire under parts yellow ferruginous; legs and palpi same; antennæ black. The club brown on upper side. The rest ferruginous.

Female.—Expands 2.3 inches. Similar to the male in all respects.

From several ♂ ♀. I formerly received examples of this species from the Wheeler Expedition, but it has been very rare in collections of North American butterflies. It flies through Mexico and South. The yellow under surface is a distinguishing character.

AMBLYSCIRTES NANNO.

Female.—Expands 1.3 inch. Upper side brown, thickly dusted with fulvous scales over whole surface; primaries have three small white sub-apical spots on costa and an oblique line of four small spots, the outermost opposite cell near hind margin, or a little beyond disk; on secondaries an obscure transverse row of small yellowish spots; fringes of primaries alternately white and brown, of secondaries white.

Under side of both wings dark brown, a little dull fulvous on

cell and disk of primaries; the surfaces, especially of secondaries, much dusted with white; the spots of primaries repeated, and in addition a spot in cell; secondaries have a curved row passing from near base on costal margin entirely around both margins, ending at sub-median nervule; eight spots in all, small white, also a spot in cell.

From 1 ♀.

ON THE PTEROGOSTIC AND OTHER CHARACTERS OF EUCATERVA.

By A. R. Grote.

The male antennæ of *Eucaterva Variaria* are bipectinate, the long ciliated branches diminishing in length gradually to the tips. The stem is mostly covered on the outside by white scales, and the branches also are tipped with white scales. The simple female antennæ are nearly all black; they show an interspersing of white scales, especially towards the base. The male labial palpi are curved, stretched forward beyond the front, marked with black and white scales; the long second joint is twice banded with black and white, the third article is tipped with white, the black base corresponding with the black spots on the second article. The female palpi are shorter, projected more straightly forwards. The terminal article is tipped with black. What is singular is that in the individual, which I am disposed to believe is the typical ♀, the palpi appear really shorter than in the specimen which I regard as the variety. The eyes are naked, ocelli wanting, the clypeus broad and rather full. The tongue is apparently rudimentary, as in three specimens which I have carefully examined I find no appearance of it. I have not broken off the palpi, however, which may conceal it.

I regard as the typical female the form in which the middle of the primary is taken up by a deep black opaque shading, leaving the costa and internal margin white.

The variety wants this black broad stripe and is immaculate white, black dotted, and reminding us of *Catenaria*. This variety I call Labesaria.

The abdomen, especially in the female, is somewhat clumsy and vermiform. The scales are rather thinly laid on. The white wings of the variety *Labesaria* are somewhat transparent. In the male the front wings are thickly powdered with black over the centre, and this black shading takes on vaguely the shape of the black portion of the wing in the typical female. But the most obvious difference between the sexes is the absence of the two median lines of the male primaries above, in the two female forms.

The examination of the entire forewings of the female typical

form shows that the tegument extends much beyond the costal vein at the shoulder of the wing; the costa is a little depressed at the middle. The cell is closed; vein nine, a short furcation out of eight. On the secondaries the cell is also closed and divided centrally by a vein. There is a long, narrow auxiliary cell in the forewings, from the apex of which ten is thrown off to costa, and a little beyond this, towards the base of the wing, vein eleven is thrown off from its upper edge to costa. A second smaller cell is formed above the sub-costal vein, stretching to base of wing, by a cross-vein from vein twelve. The neuration is not very different from *Dasyfidonia*, and assists our classification of this interesting moth among the *Fidoninæ*. The moth is always remarkable from the unusually long, cylindrical, closely scaled labial palpi, no less than for what seems an instance of dimorphism in the female sex.

SOME ADDITIONAL NOTES ON ADELOCEPHALA BICOLOR. *HARRIS.* WITH DESCRIPTION OF A NEW VARIETY.

By H. S. Jewett, M. D., Dayton, Ohio.

ADELOCEPHALA BICOLOR. *Harris.*

Var. IMMACULATA. n. var.

Size and shape same as *A. bicolor*. Color, ochre yellow. In typical *bicolor* the upper surface of the primaries and lower surface of secondaries are sprinkled with small black dots. *In this variety these dots are entirely wanting.*

The oblique line and discal spot of primaries are marked, more or less strongly, by pale red. The red of the upper surface of secondaries and under surface of primaries is much paler than in the typical insect, and covers only the anterior two-thirds of upper surface of secondaries, the posterior one third being pale ochre-yellow.

Thorax and abdomen are pale ochre-yellow above, inclining to brown beneath.

About one per cent. of each brood are of this variety.

In my description of the larva of *A. bicolor* which appeared in the March number of this journal, I stated that I had never found the "silver horns" on any other segments than the fifth, seventh, ninth and tenth. I have now to add that this year I reared three larvæ having these silver horns on every segment except the twelfth; still, the imagines from these three larvæ did not differ from the ordinary form.

The moths vary very much in color and amount of ornamentation. Thus the ground color varies from pale ochre-yellow through yellow-brown to reddish purple and purple-brown; or

the portion of the primaries anterior to the oblique line may be ochre colored, while the portion posterior to that line is some shade of red-brown or purple-brown. Again, the upper surface of the primaries and under surface of secondaries may be entirely free from black dots (as in var. *immaculata*), or these surfaces may be very densely covered with the black dots, with every intergrade between the two extremes. The oblique line across the primaries is generally present, but may be entirely wanting. Finally, the whole of the upper surface of the secondaries is generally red, though the red may be confined to the anterior two-thirds of the wing, as in *immaculata*, with intergrades between the extremes.

OBITUARY.

CHARLES GODREY SIEWERS, of Newport, Ky,, a well known entomologist, and a Cor. Memb. of the N. Y. Entomological Club, died on September 6, 1882. He was a son of the Rev. Henry Frederick Siewers, a missionary of the Moravian Church, and was born on the island of Santa Cruz (or Saint Croix), in the Danish West Indies. At the age of about five years he was sent to Nazareth Hall, a Moravian Academy at Nazareth, in the State of Pennsylvania, for his education, where he remained until the age of fifteen, when he was apprenticed to E. W. Carpenter, a manufacturer of planes, etc., at Lancaster, Pa., to learn the trade. In 1837 he settled in Cincinnati, where he went into the manufacture of saws and other tools. Being very fond of fruit culture, he removed in 1858 from Cincinnati to a farm some four miles south of Newport, Ky., near the Licking River, where he planted a vineyard and fruit trees, to which he devoted all the time he could spare. The grape culture proved unprofitable, and in 1872, his health and strength failing, he retired from active business. He spent much time during his last years in the study of entomology, and contributed articles embracing the results of his investigations to periodicals devoted to his favorite science. In him those who knew him well found a man of culture and refinement, of bright and poetic thought and expression, of genial and cheerful spirits, and of high moral worth.

BOOK NOTICES.

NEW CHECK LIST OF N. AM. MOTHS, AND ILLUSTRATED ESSAY ON THE NOCTUIDÆ. BY AUG. R. GROTE.

Mr. Grote is well known not only in this country, but throughout the world, as one of our hardest-working entomologists, and the labor that he accomplishes, even against the pressure of a poor state of health, is absolutely surprising. His "New Check List" is a model catalogue, and is perhaps the truest evidence to be found of the vast knowledge of its author of the subject upon which he treats. It embraces the whole of the known species of Heterocera published up to August, 1882 (exclusive of the Tineidæ), and includes Prof. Fernald's late catalogue of the Tortricidæ. The following are the number of the species catalogued in each family: Sphingidæ, 91; Ægeriadæ, 111; Thyridæ, 4; Zygænidæ, 57; Bombycidæ, 375; Noctuidæ, 1409; Geometridæ, 403; Pyralidæ, 326; Tortricidæ, 406. In his preface Mr. Grote says: "The present list of names of described species of N. Am. Moths is as correct and complete as I can make it in the present state of our knowledge of the families here included;" and it is not too much to add that the work is by far the most perfect catalogue yet issued from the press wfth reference to American Lepidoptera. It displays in an eminent degree Mr. Grote's knowledge of the groups to which he has devoted most of his attention, and is a volume absolutely indispensable to all who study the Heterocera of this country. To catalogue properly one of the groups alluded to is no mean labor, and we do not hesitate to say that no ten entomologists in the U. S. could, without his aid, have accomplished the work here performed by Mr. Grote alone. The "Check List" contains seventy-three pages, including the preface, and is admirable in its "get up" and general appearance. It is printed and published by the "Spectator Press Company," New York.

The "Illustrated Essay" is a dainty book, in which the author treats his subject in a half-scientific, half-gossipy strain, and thus renders it interesting and instructive to those who do not follow the hard road of technical study. The "Structure and literature" of the Noctuidæ are treated in the first chapter, a second is devoted to "Mr. Walker's types in the B. Museum," a third to "Notes and descriptions of rare N. Am. Noctuidæ," and the work is illustrated by four exquisitely colored plates by the Messrs. Mintern, of London, in which forty-five species are figured. Mr. Grote's chapter on a "Colony of Butterflies," originally published in the *N. Am. Naturalist*, closes the volume, which has been issued by Van Voorst, of London, and is a notable contribution to N. Am. Entomological literature.

NOTES ON LEPIDOPTERA.

FEMORAL TUFTS. It may interest the readers of "PAPILIO" to know that from reading my paper on this subject Dr. Ehrich Haase, an assistant to the Zoological Museum of Breslau, Germany, has undertaken the pathological study of these appendages. He has requested the sending of such species of Catocalæ as I have captured this season, after an examination of which we shall have an opportunity of availing ourselves of the observations of this eminent pathologist. This season I have examined fresh specimens of *Catocala* and find the tufts in the males of all the larger species. I have not been able to detect them in *Catocala grynea*. C, *praeclara*. C, *gracilis* and its varieties. JAMES S. BAILEY, M. D.

FANS ON THE FEET OF CATOCALINE MOTHS. I have found these fans abundantly displayd on specimens of *Parthenos nubilis* captured by me during the summer, and have also detected them on *Catocala desperata* and *Catocala amatrix*, in all cases only upon the ♂ sex. HY. EDWARDS.

NAPTHALINE CONES. As a defense against destructive insects, I can bear ample testimony to the value of these cones. Last year I suffered greatly from the depredations of the well known small red ant, the bodies of freshly caught Lepidoptera being eaten entirely away, and great damage done to the wings, by the scales being bitten off by these pests. This year, in each of my store boxes, I have placed one of the Naphthaline cones, and though the ants have been as abundant as ever, I have not lost a single insect, out of nearly 3000 specimens. I desire also to say that I do not observe the smallest trace of "grease" arising from the use of the cones. HY. EDWARDS.

CALLARCTIA ORNATA. Packard. I find after careful investigation, that this form, which has long been a puzzle to entomologists, is only one of the innumerable varities of *Arctia achaia*, G. & R. and that it is the same as the No. 1 of my notes on this species, ("PAPILIO," vol. 2. p. 91.) I have a specimen from Butte Co. Cal., which fits the description exactly, even to the median outer spot being divided by the pale median nervules. I believe that at the time Dr. Packard made his description, that of *A. achaia* had not been published. R. H. STRETCH, San Francisco.

LARVÆ OF SPHINGIDÆ. The newly-hatched larvæ of several of the *Sphingidæ* appearing on the *Ampelopsis quinquefolia* and grape, in June and July, are very easily distinguished, even as they emerge from the egg. *Thyreus abbottii* appears earliest, in 1881 about June 1st, in 1882 near the 20th. The larvæ are cylindrical, of a uniform light blue-green with a powdery bloom, body finely striated transversely. Stigmatæ indistinct. Anal horn erect, black, yellow at the base, long and very slender. *Amphion nessus*, from one to two weeks later; is cylindrical except a slight enlargement of the third and fourth segments, increasing at every moult. Body pale yellow-green, with two light, longitudinal, subdorsal lines, straight from the head to the eleventh segment, thence curving to the anal horn, which is short, black, ochrish or red-brown at the base, tapering abruptly, and often carried in a line with the back. *Philampelus achemon*, which should arrive with the close of June, this year comes in July's second week. The larva is cylindrical, of a pale apple-green, with a distinct yellowish line formed by folds of the skin, dividing the segments, and light, perfectly straight subdorsal lines. With this comes *P. pandorus*, the larvæ very similar in early stages. Both species change after two or three moults, to rich dark wine-color, straw-color shading to vandyke brown, or other beautiful colors. A *P. achemon*, bred from the egg, at second moult became a clear, light cherry-color, growing brighter for several days. JULIA E. SANDERS, Davenport, Iowa.

PROBABLE DIFFERENCE IN TWO BROODS OF DRASTERIA ERECHTHEA. Several years ago, while examining specimens of this species, I found that the first brood of the moths captured in New England in May and June were smaller than the August brood. Seven specimens of the spring brood of the ordinary gray tint had fore wings .65 inch in length; the ochreous variety, .67 inch. On the other hand, the average length of the fore wing of the August specimens is .82 inch. If this difference between the two broods is found to be permanent, it might be attributed to the fact that the smaller size of the spring brood is due to the autumnal brood of larvæ feeding in late summer and early autumn on less juicy and nutritious food than the mid-summer caterpillars, the young of the August brood of moths, when larvæ feed on fresh, green clover. It will be remembered that, according to Mr. William Saunders, the food plant of the common moth is the clover. Having received a considerable number of this species from upper California and Oregon, I have found that they are uniformly much larger than Eastern examples. The normal gray form has fore wings .84 inch in length, while those of the ochreous variety measure .95 inch. It thus appears that the Pacific coast specimens are much larger than Atlantic coast examples, and

that the same distinctions in size obtain between the common gray and the ochreous form. We have noticed this species in our Monograph of Geometric Moths, p. 587, as an example of the law of increase in size westward and southward of species common to both sides of our continent. (See p. 589). A. S. PACKARD, JR.

PHYCIDÆ OF THE UNITED STATES. Mons. E. L. Ragonot, of Paris, is devoting considerable attention to the study of this difficult group, and invites the co-operation of collectors in this country. M. Ragonot is already assisted by the loan of the collections of Zeller, Staudinger, Snellen, Druce, Moore and Lord Walsingham, and has therefore abundant material on hand for a monograph of this little-known family. I shall be happy to forward specimens to M. Ragonot from any of the subscribers to PAPILIO, due credit being given for the same. HY. EDWARDS.

SPECIES OF PYRALIDÆ OMITTED FROM THE NEW CHECK LIST.—The following names, I find, have been accidentally omitted in the *Pyralidæ*. For their detection I am indebted to my kind friend, Prof. C. H. Fernald, who is good enough to write me: "I have just been through my Pyralids and arranged them according to your 'New List,' which the more I work with the better I like it. You have omitted the names below:

(Page 52.)

FABATANA, Walk.
20½ Oviplagalis, *Walk.*
Anthoecioides, G. & R.
CHYDONOPTERON, Riley.
22½ Tacomæ, *Riley.*

(Page 55.)

AMBESA, Grote.
248½ Laetella, *Grote.*"

A. R. GROTE.

PARNASSIUS THOR. Hy. Edw.—Having recently had an opportunity of examining the ♀ of *P. Eversmanni.* Men. I have no hesitation in referring *P. Thor* to this species, though the size and intensity of the red spots, and the much smaller expanse of wing, perhaps, entitle it to be considered as a variety. The synonomy should stand: *P. Eversmanni.* Men. Siberia. Var. *P. Thor* ♀. Hy. Edw. Alaska. HY. EDWARDS.

A YOUNG LEPIDOPTERIST.—The following note from a young lady, twelve years of age, is deemed worthy of publication: "Dear Mr. Edwards: The moths of *Eugonia alniaria* are now coming out in numbers, the species being common on Staten Island. I thought this might interest the readers of 'PAPILIO.'—Yours affec., ANNA GROTE, Oct. 10."

PAPILIO.

Organ of the New York Entomological Club.

Vol. II.] Nov.–Dec., 1882. [Nos. 9 and 10.

DOUBLE NUMBER.

NOTE.—It was impossible to issue the November number in proper time, so that the articles which would have composed it are given with the December number, making the same amount of pages.

ON PAPILIO MACHAON L., AND ITS N. AMERICAN REPRESENTATIVES—; PAPILIO RUTULUS. BVD.—; AND PARNASSIUS. BEING PORTION OF A PRELIMINARY REPORT ON THE BUTTERFLIES OF WASHINGTON TERRITORY.

BY DR. H. A. HAGEN.

As far as I know all insects, hitherto described, from Washington Territory were collected west of the Cascade Mountains. The larger portion of this Territory east of the Cascade Mountains, north of the Columbia River, to the frontier of Idaho, has never been visited by entomologists, except perhaps the southeastern belt of the Wallula Valley. The climate of the country east of the Cascade Mountains is very different from that west of them, the latter being similar to the climate of California. The country east of the Cascade Mountains consists to a large extent of the basin of the Columbia River, with immense sage-brush deserts, and here falls the least amount of rain through the U. Sts. At right and left mountains, with a rich vegetation of forests and large fertile valleys, ascend to the Cascades, and the Rocky Mountains. It is one of the few parts in the U. Sts. not yet examined by entomologists, and the good chance to collect here was offered by the N. Transcontinental Survey, under the direction of Prof. R. Pumpelly. The collection of butterflies made by *Mr. S. Henshaw* and *Mr. R. H. Stretch* is large, and contains interesting species, which may justify a preliminary report.

The preparation and spreading of the butterflies has only been

commenced, so that but imperfect notes can be given, but as the collection of the Cambridge Museum, contains a large number of species, determined by the best authorities, the notes based upon a careful comparison of the Washington Territory species with those in the collection may be acceptable.

The specimens were collected from June 24 to July 27, from Umatilla to Spokane Falls. Some were taken near the Falls and at Umatilla, on the Oregon side of the Columbia River, where Mr. Morrison collected for a few days. After July 27 some were collected in Western Montana. In Washington Territory we crossed the desert opposite Umatilla, and followed the Yakima River and the valleys on the right side to the fork in the Cascade Mountains, returning *via* Ellensburgh, and through the desert to Ainsworth and Spokane.

PAPILIONIDÆ.

P. ZOLICAON AND P. OREGONIUS.

The large number of specimens of both sexes (74) approves the statement that both species *cannot be separated.* Half of them were collected June 24, 25, at Umatilla, on the Oregon side of the Columbia River; the other half in Washington Territory, just opposite Umatilla, June 26. One old and torn specimen July 18, at Lone Tree Camp, near the Yakima River. Some collected at Spokane are in the collection of Mr. Ricksecker. The main part of the specimens belongs to *Pap. oregonius.* The typical *P. Zolicaon* is only represented by half a dozen specimens flying promiscuously with the others.

The true *P. Zolicaon* is to be recognized—I—by the black spot in the anal rufous spot *entirely* isolated above and below; II—by the cell of the primaries on the under side wholly black; III—by the abdomen being black, with only a yellow side stripe; IV—by smaller size (of W. H. Edwards). Concerning the black isolated spot (I.) I find among the Californian specimens in the collection one female with a continuation of the spot on the under side to the black stripe which edges the inner margin. Mr. W. H. Edwards has figured pl. 6 f. 4 *exactly* the same for the female of *P. Zolicaon*, without mentioning it in the description. The specimens from Washington Territory have the spot either isolated or connected below. Some specimens of the true *P. oregonius* possess isolated black spots, sometimes only in one wing. There are before me *all intermediate* forms of a spot entirely isolated, or partly or wholly connected with the black stripe of the edge. Concerning the cell of the primaries (II.) some *P. oregonius* with a connected spot and a yellow abdomen have the cell partly or even *entirely* black as *P. Zolicaon;* on the contrary, some *P. Zolicaon* (with a largely black abdomen) have the cell yellow as *P. oregonius.* The color of the abdomen (III.) is, indeed, largely black in *P. Zolicaon;* but sometimes true *P. oregonius* (with the spot

connected with the inner margin, and a yellowish cell of the primaries) have the abdomen as largely black.

The size is very variable. *P. oregonius* male expands from 80 to 98 mm. (3¼–3¾ inch); the female from 100 to 110 mm. (4–4½ inch). *P. Zolicaon*, male, from 78 to 86 mm.; female 92 to 94 mm. (100 mm., W. H. Edwards). The tail of the wings varies in length from 5 to 9 mm.; in breadth from 1 to 2½ and sometimes to 3 mm.; its form is very variable, strongly spathulated or rounded or pointed at the tip.

In Yakima Valley, July 5th, Mr. Henshaw found a full grown caterpillar feeding on wild parsnip, Mr. Stretch one on sage. The first one escaped by accident, but Mr. Stretch managed by ingenious contrivances to educate the imago, which proved to be *P. oregonius*. The caterpillar is very similar to that of *P. machaon* in form, color and pattern. As I am very well acquainted with the latter, I remarked directly a difference. The first transversal black band behind the head has a large gap in the middle, perhaps as large as the remaining part of the band, on each side. *P. machaon* has never this band interrupted, at least not in the specimens before me; nor find I mentioned such an interruption in any description or figure of the caterpillar; also not in Mr. Stretch's figure and description of *P. Zolicaon*, published by Mr. W. H. Edwards, and not in his description of *P. oregonius*, "PAPILIO," II., p. 120, The chrysalis agrees with that of *P. Zolicaon*. Mr. Stretch has made a colored sketch of the caterpillar. The chrysalis skin is before me.

After all, there is no doubt that *P. oregonius* is merely a variety of *P. Zolicaon*, mostly larger in size, more yellow, the black spot connected with the black interior anal band, which is somewhat dilated on tip, the black bands of the abdomen narrower.

P. oregonius (not *oregonia*, as Mr. Edwards writes), was very common on both sides of the Columbia River at Umatilla, June 24th to 26th; at The Dalles, June 23d, it was not observed, though eagerly looked for. It was not seen June 30th at Lone Tree on the Yakima River, but on returning to the same place July 18th, one old specimen was collected; probably *P. oregonius* had there appeared and disappeared in the time between those days.

At the mouth of the Natches river, at a higher elevation, July 4, the full-grown larva was still found, therefore the imago would not appear there before the end of July. The specimen raised by Mr. Stretch appeared July 25.

When *P. oregonius* was observed at Umatilla we all believed it to be *P. machaon*, the more so as Mr. W. H. Edwards had just published ("PAPILIO," p. 74) the capture of a specimen by Mr. H. Edwards at The Dalles, where we had looked for this species without success. A careful comparison of Mr. W. H. Edwards' paper with the materials at hand has given the following result.

The material consists for the European species, twelve specimens (Germany, Austria, Switzerland, Alsace) especially selected for the collection out of a very large number and representing all varieties in size, color and pattern, which I was able to observe; and one *P. hospiton*. The material for the Asiatic species (from East India, Amballa, Koolloo, Himalaya, about 6000′ high, Jalloree-pass, Himalaya, more than 10,000′ high) thirty specimens especially selected out of about 500 specimens as representing all varieties. I possess only one male from Tokio, Japan. Finally a couple collected by Mr. Chas. Wright at Owaska, Kamschatka, probably fr. Wilkes' Exp.

Exp. alar.

European spec., male, 72 to 88 mm., female 82 to 92 mm.

Asiatic spec., male, 72 to 96 mm.; female 78 to 96 mm.

Kamschatka spec., male, 72 mm.; female 84 mm.

The tail of the hind wings.

European spec., length 5½ to 9 mm.; breadth 1 to 1¼ mm.

Asiatic spec., length 5 to 10 mm.; breadth 1 to 1½ mm.

Kamschatka spec., length 5 mm.; breadth 1 mm.

The main average of the size of *P. machaon* is smaller than in *P. oregonius* and similar to *P. Zolicaon*, though there exist males of *P. oregonius* of the same size of *P. machaon*. The tail of *P. oregonius* is mostly broader, but not longer.

The description of the var. ASIATICA Ménétries quoted by Mr. W. H. Edwards stated "the submarginal border of the hind wings to be very broad, with the inner edge straight, and reaching nearly the end of the cell." In my Asiatic specimens this border is broad 4 to 7 mm., and in the European specimens 4 to 6 mm. The inner edge of the border of the Asiatic is mostly less concave than in the European ones, and *exceptionally* nearly straight; others show the same curve as the European ones. In specimens from Switzerland the inner edge of the border goes as near to the cell as commonly in the Asiatic ones; and other Asiatic specimens show the cell even more distant from the border as commonly as the European ones. The final note by Ménétries, "the marginal border of the Himalayan specimens is very much larger," belongs, apparently, to a comparison with those of Kamschatka, as the words before the N. B., "de l' Himalaya et Kamschatka," prove. Indeed the latter have the marginal border of the male 2½ mm. broad, of the female 4 mm. As the specimens from Himalaya and from Kamschatka mentioned by Mr. W. H. Edwards were communicated to him out of the collection of the museum, my remarks cover the same specimens.

The remark by Mr. Felder (Wien. Z. B. Ges., IV., p. 363, Mr. Edwards quotes the pamphlet edition, p. 75) "*var. asiatica* discrepans alis adhuc brevioribus posticisque in regione anali magis productis," is refuted by the measures given above. Mr. W. H.

Edwards quotes "the hind wings are shorter," which would be a contradiction.

I am not able to concur with Mr. W. H. Edwards that the name, *asiatica* Mén., does not apply to the prevailing type in Southern Asia; Mén. specimen was only a little more exaggerated. Mr. Kollar, in Huegel's Kaschmir, vol. IV, p. 406, saw some specimens from Himalaya, "different from *P. machaon* from Vienna, Austria, by darker yellow (this is true for the Koolloo specimens, but those from Jalloree-pass are bright yellow, just as the European ones), a little broader marginal bands, the black nervures in the yellow fields broader, more similar to the local varieties of Southern Europe and Dalmatia."

De Haan (Papil. nederl. overz. bezit. p. 42) says, "*P. machaon* is also found in Japan, without difference in colors; but the hairs on the end of the abdomen and on the inner border of the hind wings are longer and cover a part of the middle cell, which is not the case in the specimens from Netherlands." This is true for Himalaya specimens before me, but I have some European ones with equally long hairs. One male of *P. machaon* from Tokio, Japan, is before me. The hairs are as described by De Haan; the yellow color is as bright as in the European specimens; the blue spots in the band of the hind wings are larger and brighter. The submarginal series of yellow spots along the margin of the front wings is large and orbicular, the first and the last spot are ovoid. The European specimens have those spots as half moons, sometimes in crescent-shape. The external border of the spots offers a straight but interrupted line. The Himalayan specimens have these spots partly as in the European ones, partly orbicular as the Japan specimen, or more or less rounded, sometimes very small and largely distant. The Kamschatka specimens have the spots similar to the European ones. Meigen has figured a variety from Europe with all the spots connected, forming a band. There is to be found in the Tijdschr. v. Ent., 1852, vol I., p. 129, a remarkable paper by Mr. Ver Huell, with a colored plate of *P. machaon*, caterpillar, chrysalis and imago, which I find nowhere used or even quoted. The late brother of Mr. Ver Huell had raised (as he believed) an imago from a caterpillar before the last moult, being in the third stage. The editor believes this statement to be erroneous, "as nearly all caterpillars had changed after the last moult from black to green." The editor tried to repeat the observations of his brother by collecting a number of not full-grown caterpillars and providing them with a satisfactory quantity of food. Nevertheless some of them were black when transforming into chrysalis. As he supposed, they had maintained the black color after the fourth moult. From one-third of these chrysalis were raised two imagos, somewhat crippled but enough developed to show the identity with the specimen raised by his brother, which is figured. Besides the very small size (the

figure shows a dwarf expanding 55 mm.) "the black bands and spots are larger; the orange spots on the under side of the hind wings are rarely seen in a well-developed imago." Ver Huell declared this imago to be *P. sphyrus Huebn.*

The collection of the museum has a similar dwarf from Switzerland (length of upper wing 30 mm., in Ver Huell's figure only 28 mm.); but Ver Huell's description does not mention two very important characters represented in the figure; the basal half of the cell on the under side of the primaries is black and their sub-marginal band suddenly diminished before reaching the costal-margin. The statement of the rare appearance of the orange spots in the imago is not true, after the specimens before me.

The same volume of the Tidschr has a paper by Mr. M. C. Verloren, "Observations sur le *P. machaon*," p. 90–108, which has been also entirely overlooked. The paper is the first, as far as I know, in which the influence of the cold temperature on the colors is acknowedged. Mr. Verloren observed many varieties in the coloration of the caterpillars; the black caterpillar is the most remarkable one. The black color replaces the green main color entirely; only some faint dorsal lines and some irregular green spots on the sides are left. The black variety belongs to the spring generation of the imago, at the beginning of the fall being rare, it becomes later dominant. The imago belonged to *P. sphyrus.* The paper contains besides many interesting observations not used by later Lepidopterologists.

I have never seen *P. sphyrus* (figured by Huebner, I, 155, p. 775–776.) from Europe. Huebner's figure represents, indeed, a *real machaon*, in size and colors exactly like the *var. asiatica* from the Himalaya.

Mr. Dutreux, Stett. E. Zeit., XV., p. 320, in his abridged translation of Ghiliani's paper on *P. hospiton* states, that *P. sphyrus* is on the whole similar to *P. hospiton;* the blue band above the orange spot is just as in *P. machaon* and not separated from the orange by a black border as in *P. hospiton.* I have only one specimen of *P. hospiton* before me, and I agree that it is a *very exaggerated* variety of *P. machaon.* Nevertheless, there exist more prominent differences, except the one quoted by Ghiliani between *P. hospiton* and *P. machaon.* The tails are excessively short, 2 mm.; the black band of the hind wings is much larger, covering nearly the outer half of the wing and reaching very nearly the cell. Nevertheless, the nervures in the basal yellow half are considerably less black than in the primaries and even less than commonly in *P. machaon;* the hairs of the abdomen and of the anal border of the hind wings are longer and more numerous; the under side of all wings differs even more, the basal part of the cell of the primaries is black; the marginal black band of all wings show between every two nervures a black elliptical curve, and the

band of the under wings lacks on its internal margin the black bands; instead of them the small blue spots are internally surrounded by a very small black elliptical curve, at some distance from the inner margin of the band.

Zeller, in Isis, 1847, p. 216–219, speaks at some length on *P. sphyrus* and *P. hospiton*. *P. sphyrus* he puts with a ? as the spring form of *P. machaon* (Freyer, New Britr., I, p. 139, says; "*P. sphyrus*, Hueb., is simply a *P. machaon*,") pilosior abdominis dorso late nigro, alarum anteriorum venis dilatis, omnium fascia postica *latiore*. He concludes with acknowledging the very considerable variation of *P. machaon* in color, pilosity, size, shape and in the length of the tail.

Concerning *P. hospiton*, Zeller discusses in detail the figures and description of Herrich–Schaeffer, pl. 53, f. 249–250, p. 140. (They agree exactly with the specimen in the collection of the museum.) Zeller mentions specimens collected near Messina, Sicily, and concludes, finally, that the only difference of importance is represented in the black line separating the red spot in the angle of the hind wing from the blue lunule above the spot. But, he continues, the shape of the red spot (a crescent by Herrich–Schaeffer, and transversal ovoid in the museum's specimen) is variable in *P. machaon* and *entirely wanting* in the variety from Hamburg, figured in Freyer, New Britr., I pl., 74. This variety is even more remarkable as the figure of the under wing has on the under side a small red crescent divided from the blue spot by a large black band just as in *P. hospiton*; the basal half of the cell of the primaries is black, except a small paler spot near the base, just as in *P. sphyhus*. Zeller does not mention these two differences.*

The only description of the caterpillar of *P. hospiton* by Mr. Boisduval, Index p. 1–3, is short, "green with black, whitish and red punctated, with aborted spinules; living on *Ferula communis*." Mr. Zeller objects against the spinules, but Mr. Verloren, l. c., p. 95, says: "Before the fourth moult the caterpillar possesses short spines, which disappear nearly entirely after the fourth moult. In the black variety these spines remain more apparent than in the green caterpillars." Besides that Mr. Boisduval has not stated that his caterpillar was full-grown, Verlorens remarks cover the case.

Dr. J. Delaharpe, Contribut. à la Faune d Sicile, Lausanne, 1860, p. 33, describes as intermediate form between *P. machaon* and *hospiton* a large female from Sicily. The primaries are as in P. *machaon*, the underwings and abdomen similar to *P. hospiton*.

Mr. Bellier de Chavignerie, Am. Soc. Ent Fr., 1860, p. 674

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* In *P. Zolicaon* the red spot in the angle of the hind wing is always separated from the blue lunule above it by a black line; but I find in some *P. oregonius* the indication of a black line, beginning from he outside to separate the red spot on the underside of the wings; even some of the var. *asiatica* show he same, but more faint.

says: All *P. machaon* from Sicily belong to *P. sphyrus*, but the spring form is darker and intermediate of *P. machaon* and *P. hospiton*.

I have given, as I believe, before ample and satisfactory proof concerning the variation in color of *P. machaon* and its most extreme forms, *P. hospiton*, *P. sphyrus* and *P. asiaticus*. It should be remarked that Dr. J. Delaharpe, l. c., p. 1–6, gives, 1860, very detailed and interesting examination of the causes which produce a change of color in butterflies and caterpillars. His paper has never been used in the literature concerning this question.

But not only the imago shows a large variation in color by *P. machaon*. The caterpillar and the chrysalis differ also considerably. Concerning the caterpillar, all stages, except the second, are well figured by Sepp. F. I., G. I., pl. 3.

The full-grown black variety, by Ernst T., I., pl. 34, f. 68, b.; by Freyer, l. c., pl. 74, the first stage and the full-grown black variety; by Ver Huell, l. c., pl. 7, f 1, the full-grown black variety. The full-grown green caterpillar is everywhere figured, sometimes together with the first form, Huebner Gesch. Schmett, pl. 47 and 49 with the chrysalis. Also De Geer gives good descriptions of the previous stages of the caterpillar. It is stated that the black variety gives imagos alike *P. sphyrus*.*

There are commonly two forms of the chrysalis, one green, the other gray, which forms do not belong to the different sexes. There are numerous communications in the Ann. Soc. Ent., Fr., about the two forms, after 1868. Mr. Fettig had contended that the color of the chrysalis changes conforming to the attachment on green or dark objects. Mr. Fallou, ibid Proc. 1871, p. 54, proves, by experiment, that this is not the case. The same author and Mr. Mabile, l. c., 1872, Proc. p. 55, state the same difference in the chrysalids of *P. hospiton*. A figure of the chrysalis of the black variety of the caterpillar is given by Mr. Ver Huell, l. c., pl. 7., f. 2.

Having tried to state the hitherto known limits in which *P. machaon* of the old world can vary, I arrive to the knotty question of the American *P. machaon*. Of the specimens quoted by Mr. W. H. Edwards ("PAPILIO," I, p. 75), I have only seen the type of *P. aliaska*, Scudder. I had the benefit to compare this type, together with the specimen of *P. Zolicaon* with which the author had compared it. A comparison with the Asiatic form was in 1869 entirely impossible for the author, as then no specimen existed in American collections, and only very few in Europe. The type of *P. aliaska* expand 80 mm.; and is identical with *P. oregonius*. The tails are very short, a little less than 5 mm. long. Among the differences noted by Mr. Edwards, the first one is remarkable, the hind margins of the fore wings are convex in all specimens seen by him. This is exactly the case in *P. aliaska*.

* Dr. Weisman Stadien, vol. II., pl. 2, f. 36, figures the sixth segment of the caterpillar of *P. hospiton* (apparently black var.), *P. machaon*, *P. Zolicaon*.

Among the large number of *P. oregonius* very few have this border straight, and only one a little convex. Among *P. Zolicaon* one from Mendocino and one from Washington Territory have the margin as convex as *P. aliaska*. Among the Asiatic specimens those from Kamschatka and two from Koolloo, Himalaya, have the margin convex, several others only a straight margin. Among the European specimens before me some have a straight margin, none a convex one. But the two varieties quoted before as figured by Ver Huell and Freyer have a convex margin. I think if even all Hudson's Bay and Aliaska specimens should possess a convex margin, this can only be considered to be a local variation. Messrs. Scudder and Edwards do not mention the shortness of the tail; after all, my measures show its extreme variability.

The second difference noted by Mr. Edwards, that the black parts are more intensely colored and less dusted by yellow scales, and the nervules very considerably edged with black, is not true for *P. aliaska*. The large material before me proves this statement for the Himalayan specimens, and even for some European ones to be incorrect.

I have given considerable attention to another difference; the black sub-marginal band of the primaries between the yellow part and the row of yellow spots near the margin. Mr. Scudder has used the same character for the band on the upper side of the wing. I speak here only about the same band on the *underside* of the wing. It is very rarely entirely black, mostly more or less dusted with yellow scales in the middle of each cell. I find it entirely black in one *P. Zolicaon* from California, and three *P. oregonia* from Washington Territory. Mostly the yellow dust in the cells is connected to form a narrow or larger yellow middle line. Finally the band becomes yellowish-gray, bordered on both sides by a black line, the internal one broader. Near the anal margin the end of the band remains mostly black; near the costal margin the large marginal cell connected with the band is entirely black, or in part, or entirely yellow, with a broad black border on its basal end. The sub-marginal band is equally broad throughout or narrowed in approaching the costal margin. In the latter case two different ways are followed; or the inner margin of the band is straight to the tip and only gently sloping to the external margin, forming a more or less pointed band, or the two last cells have the internal black border removed more outwardly, so that those cells are similar to the steps of a stair. There exist intermediate forms where the internal margin of the second cell is oblique and connected at its base with the margin of the third cell so that this part of the band is sloping.

P. machaon from Europe has this band mostly straight, only the first cell narrower, broad 4 mm., first cell 2 mm., or broad 3 mm., first cell 2 mm. Some specimens from Austria, Alsace,

and Switzerland belong to the intermediate form. The specimens from the Himalaya have the band as the European ones (sometimes larger, 6 to 4 mm., 4 to 3 mm.); a number belongs to the intermediate form (3 to 1½ mm.) and a few to the sloping forms (4 to 1¼ mm.). The Japan specimen has the European form, but the black borders of each cell are curvated instead of being straight. In *P. hospiton* the curvation is much more exaggerated. The couple from Kamschatka have very narrow sloping bands (3½ to 1 mm., 2½ to 1 mm.).

P. Zolicaon and *P. oregonius* have mostly sloping bands (4 to 1 mm., or even 6 to 1 mm.). But there are specimens of both species of the intermediate form and even of the European form; to the latter one belongs *P. aliaska* (4 to 2 mm.).

Therefore the band is generally straight in the European specimens; of the intermediate form in the Asiatic specimens, sloping in the American specimens. But everywhere specimens exist ranging exactly or nearly so with those of the other parts of the world. Besides the breadth of the band is equally variable in all those parts. Nevertheless the mostly sloping form of the band is about the principal character for the American specimens of *P. Zolicaon* and *P. oregonius*.

De Haan (in Verh. over de Naturl. Gesch. von Nederl. overz. Bez. Zool. Lepid. p. 42., pl. 5, f. 2) published and figured a a variety of *P. machaon* female of much larger size exp. 4½ inch (115 mm.); on the primaries the basal band less sharply cut and on the costal margin more nebulous, as is also the band along the margin of the under wings, which passes over the tip of the cell. Tails twice as long as usually; on the underside the four spots along the costal margin nearly yellow; on the under wings the middle band darker blackish, with sky-blue spots in the middle, internally cut in curves, externally ending in a yellowish color. Collected at Nangasaki, Japan, by Siebold.

Mr. Felder (in Wien. Z. B. Gesell., XIV, p. 314 and 362, No. 201) has made of this variety after two females from Japan his species *P. hippocrates*. This description, though somewhat difficult to understand, differs not from De Haan's, but he adds that the front wings are shorter, the hind wings longer, the blue moon above the red anal spot well separated from it.

The collection of the Cambridge museum possesses several males and females of this species from Kanagawa, Japan, collected by Mr. Gulick. After a comparison of those with a female from the Columbia River, Oregon, Mr. W. H. Edwards described *P. hippocrates var. oregonia* (in Trans. Amer. Ent. S., vol. V, p. 208). "It bears much the same relation to *P. hippocrates* as *P. aliaska* bears to *P. machaon*. With some exceptions it agrees well with females of *P. hippocrates*." Mr. W. H. Edwards (in the Butterfl. of N. A., vol. II., part IX) describes the specimen as *P. oregonia* and gives the differences from *P. hippocrates*.

The three males from Kanagawa exp. 95 to 105 mm.; two females 105 to 112 mm.; the tail is 9 to 13 mm. long.

The females differ, indeed, more from *P. machaon* and *P. oregonius* than the other varieties. The yellow on the upper side is paler, more whitish, and of considerably less extent; the black ends more nebulous; the under side has more yellow, the black nearly disappearing; the blue moon above the red anal spot is separated by a strong black band. Of the three males one approaches in the color of the upper side more the females, but the two others are similar to *P. oregonius*, except that the yellow middle band of the primaries is narrower, the black band of the under wings larger, covering the end of the cell; the blue moon well separated by a black line. The tail of one male is not longer than in *P. oregonius*. The under side differs principally in the primaries where the black in the cell along the costal margin and along the nervures has disappeared. The black sub-marginal band is sloping, its internal margin waved (just as in the form from Tokio). The large black band at the apex of the cell is on the under side of all wings and in one female on the upper side, divided by a faint yellow line, which is more perspicuous on the Tokio specimen. The black band of the hind wings has the inner border straight or nearly so, reaching the end of the cell or not reaching it.

Mr. H. Pryer (in Trans. Ent. Soc., Lond., 1882, p. 486), on certain temperature forms of Japanese butterflies, says of *P. machaon*, "The difference between the temperature forms is very striking. March specimens are about 2½ to 2¾ inch in expanse and very pale colored, the summer forms expanding over five inches and are very dark, handsome insects. No alteration takes place in the markings, the colors being intensified only."

I think there can be no further doubt about *P. hippocrates* being only a marked and large variety of *P. machaon*. It is interesting to state that the colors and pattern of *P. hospiton* are about intermediate between the Tokio form and *P. hippocrates*.

Prof. A. Pagenstecher (in Verh. Heidelberg Nat. Medic. Ver., 1874, N. Serie. Heft I, p. 22, separ.), Ueber den ursprung einiger Europ. Schmetterlinge, speaks at some length about *P. hippocrates*. He has seen only the summer form, which he believes to be different from *P. machaon* and proposes for it the name *P. micado, because he has not seen intermediate specimens*," nor was he able to compare De Haan's work. He gives a full description. This paper has not been used by N. Amer. Lepidopterologists, though it treats at some length nearly all N. Amer. Papilios, and is very interesting, as he arrives to the final conclusion that the European forms are derived from the American ones. It treats at considerable length *P. asterias* and its related forms.

Can the separation of the American species be maintained? I answer boldly, *no!* After the examination of a hitherto unpar-

alleled series of specimens, showing EVERYWHERE INTERMEDIATE FORMS, they should be considered as local or climatic varieties of one and the same species of *P. machaon*. I was very near supposing that *P. zolicaon* may be a spring form, as it is said for *P. sphyrus* in Europe. But though I consider the last statement as proved, for the American species double breeding has first to be proved. It seems more probable to consider *P. oregonius* as a climatic form, occurring in a region where nearly no rain falls through the summer, where the heat is excessive (we had only two weeks below 90° and more than a week above 100°), and which is, in fact, a sage-brush desert on basaltic soil. There is a gap still to be filled; the careful and exhaustive examination of the genital appendages of the male. The pattern is the same in *P. machaon* and *P. oregonius*, but there are differences in the finishing of the detail—as it is always in varieties or races. The parts are very complicated and satisfactory description should be given by specialists.

Mr. Pryer, l. c., p. 489, has now united eleven, perhaps twelve species of *Terias* as belonging to one and the same species, and remarks in conclusion, p. 491, that neither size, shape nor color can be relied on as guides for specific distinction and that temperature has a great evolutionary effect in the character of the insects. I believe that a revision of the N. Amer. Butterflies on this basis is a want. It is probable that *P. brevicauda*, *Bairdii*, *Indra*, *Pergamus* and probably *Americus* belong all to *P. asterias*.

The *Nymphalidæ*, *Satyridæ* and *Lycœnidæ* will certainly not stay behind in similar reductions.

PAPILIO RUTULUS.

We collected at Yakima City, W. T., on milkweed, July 1 and 2, 4 males and 4 females of *P. rutulus*, and before a dead chrysalis at Portland, Or., Exp. male 96–104 mm.; fem. 104–110 mm. Length of tails 10–14 mm. The form of the tails is very variable. They are simply sloping from 3 mm. at the base to a little more than 1 mm.; or 1½ mm. broad, a little larger on the rounded tip, or twice as large on tip; or broader 2½ mm., and decidedly spathulated on the 4 mm. broad tip.

I have before me in the collection of the museum 10 specimens, 6 from California, one of them with the locality San Francisco, and 4 collected by Mr. Garman on the way from Gr. Salt Lake, Utah, to Ft. Bridger, Wy., on an elevation to 7000 feet, in July and August, male and fem. Exp. 90 to 104 mm., tail 8 to 12 mm. long, or sloping, or of equal breadth, rounded on tip or spathulated.

Concerning the literature about *P. rutulus*, nothing exists but the original description by Boisduval and Lucas, both 1852,

and the translation of the first by Rev. Morris. Mr. Felder (Wien. F. B. Ger., 1864, p. 361) says: By the shape of the wings easily to be distinguished from *P. turnus*. The female looks — primo intuitu — very similar to *P. daunus*. Mr. Mead (Wheeler's Exped., 1875, T. V., p. 741, says: Closely allied to *P. turnus;* the only constant distinction seems to be that the submarginal ray (of yellow spots) on the underside of the primaries (*secondaries Edw.*, is probably a misprint) is continuous; in *P. turnus* it is broken up in distinct spots, S. Utah; Colorado in June. Mr. Strecker (Lepid. 1877, p. 128) describes dwarfish specimens Exp. 70 mm. from Arizona as var. or ab. No figure of *P. rutulus* is known to me.

Mr. Boisduval says: *P. rutulus* differs from *P. turnus* in that the upperside of the secondaries have not the fulvous crescent on the internal angle, and the underside has not the fulvous crescent in the border, nor the sagittate spots between the border and discoidal cellule of *P. turnus* (Ann. Soc. Ent. Tr., 1852, p. 280, and Morris Lep. N. A., p. 4). Mr. Lucas says: *P. rutulus*, though very similar to *P. turuus* differs by very marked characters. The black margin of all wings is always darker and internally less sinuated; the five bands of the wings are deeper blackish, broader, principally the basal one, and internally less dentated. The series of marginal spots on the secondaries has only five crescents, sometimes only four, one of them fulvous; the yellow submarginal spots on the underside of the primaries form a continuous band; on the secondaries the fulvous marks in the centre of the submarginal spots are wanting.*

The characters admitted as proving the difference between *P. rutulus* and *P. turnus* are:

I. The submarginal ray of yellow spots on the underside of the primaries forming a continuous band (W. H. Edwards; Lucas).

II. The lack of the fulvous crescent on the upperside of the secondaries at the internal angle (Boisduval; Lucas).

III. The lack of the fulvous marks and the sagittate fulvous spots on the underside of the secondaries (Boisduval; Lucas).

IV. The margin of the wings and the five bands are broader and of a deeper black (Lucas).

It is very obvious that none of those differences are of decided importance. The examination of the constancy of those characters gives the following result:

Concerning I. and III., all 18 specimens before me agree in showing the characters mentioned here. Concerning II., 10 specimens ♂ ♀ have no spot at all on the internal angle of the secondaries; 8 spec. ♂ ♀ have a small yellow spot, or only a few

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* Dr. Behr. Stett. Ent. Z., 1866, p. 216, says: *P. eurymedon*, *rutulus* and one n. sp. can be perhaps nly local var. of *P. turnus* but ibid. 1868, p. 300, he says: *P. rutulus* is surely different from *P. urnus*,

yellow scales, or a spot more or less elongated to 3 mm. All specimens show on the same place on the underside of the wings a large yellow spot. Concerning IV. the marginal band of the upper wings is mostly 7 mm. of 2 spec. 9 mm. The second and third band near the costal margin are 5 to 7 mm. broad. The statement of Mr. Lucas that the bands and the margins are of deeper black, and the margins internally less sinuated in *P. rutulus* does not agree with the specimens of both species in my hands.

There are before me 28 *turnus* males, females and ab. *P. glaucus* from the most different localities of the U. St. (Me., Mass., N. Y., Md., La.,. Miss., Ky., Tex.), and one yellow female from Owaska, Kamschatka. They were chosen out of a very large number to represent all varieties in the collection. The size is very different, the smallest one from S. E. Kentucky has the size and characters of pl. 5 of 1 W. H. Edw., representing the arctic form. A female ab. *glaucus* from the same locality measures only 82 mm. The largest male and fem. from Dallas, Tex., measure 125 mm., also pretty near 5 inches, more than Mr. Edward's maximum. The length and form of the tail is very variable from 10 to 15 mm., decidedly spathulated or not at all. A male from Osage, Miss., has a tail only 10 mm. long, but the spathula 4 mm. broad. Comparing the differences quoted for *P. rutulus* with *P. turnus*, we find as follows:

I. The sub-marginal ray of yellow spots on the under side of the primaries of *P. turnus* consists commonly of a series of separated spots of semi-circular or semi-oval shape, the convex side internally. Sometimes these spots are connected and form a band more or less waved internally, as the female from Kamschatka. A male from Lutherville, Md., and one from Kentucky have a straight, sloping band, only the two last spots near the hind margin separated. A male from Norway, Me., the same band, only the last spot separated, just in the same manner as some *P. rutulus*. The yellow female from Lutherville, Md., has the ray as commonly in *P. turnus*.

II. The fulvous spot at the internal angle is never wanting; the females possess a very large round spot; the males have a very small spot 2 to 1 mm. long, fulvous or red (yellow and more linear in *P. rutulus*). I have males from Texas of *P. turnus* with a very small yellow spot, only interiorly with a few fulvous scales; but a male from Osage has linear yellow spot 3 mm. long, just as some *P. rutulus*.

III. The fulvous marks and the sagittate spots are wanting in two males from Osage, Miss., and from Massachusetts. Indeed, there is a faint indication of fulvous scales in the cell above the eyespot of the anal angle, but I find similar indications by some *P. rutulus*. A female from Osage, Miss., has the fulvous marks and spots as commonly.

IV. The black bands and margins show no palpable difference. Considering these statements, there exist no character belonging exclusively to one of these two species, except that the females possess always a very large fulvous spot on the internal angle of the secondaries in *P. turnus*, but never observed in *P. rutulus*; besides that of the first species, black aberrations of the female occur frequently in the Southern and Middle States.

The caterpillar of *P. rutulus* is not yet known. The differences of the chrysalis from those of *P. eurymedon* are given by Mr. H. Edwards. Dr. Behr, l. c., 1868, p. 300, says the caterpillar of *P. rutulus* lives on fruit trees.

There is, I believe, no doubt that *P. rutulus* has to be considered as a Western form of *P. turnus* as long as no other differences are known to exist. I am more in doubt or better not able now to give a decided opinion about *P. Daunus*, as the material in the museum is not sufficient. It consists of seven specimens in very poor condition. The interior tail is broken. There were two large males collected on the same place with *P. rutulus* and flying promiscuously, July 3, at Yakima City and one smaller, very poor, at Spokane Falls, July 22. The large predominant yellow field with narrow and widely-separated black lines is, indeed, very striking. In the collection are three rubbed specimens collected together with *P. rutulus* by Mr. Garman, between Great Salt Lake and Ft. Bridger, at 7000′ about elevation. There were more than a dozen, but merely fragments, not worthy of being preserved. At the same time, July and August, and in the same place, Mr. Garman collected *P. eurymedon*. One *P. daunus* from Arizona is also before me. Of course, it is well-known that different species live together at the same place and time, but in examining nearer my specimens I am entirely at loss to find characters which can be considered to be good ones to separate *P. daunus* from *P. rutulus*. The internal tail of *P. rutulus* is never longer than in *P. turnus*; say 1 to 2 mm. About the tail of *P. daunus* I can say nothing, as it is wanting in all my specimens. All other differences consist in a larger or smaller development of the main color and the pattern without decisive influence. Entomologists with a larger and more satisfactory material at hand will have to give satisfactory characters to separate the two species. But I suppose this will be a difficult task, if not an impossible one. I do not know *P. pilumnus*.

I cannot speak with certainty about the relations of *P. eurymedon*, as I have only five specimens from the Gulf of Georgia in a somewhat tolerable condition before me. It may be only stated that two specimens collected by Mr. Garman, together with *P. rutulus* and *P. daunus* will be very difficult to separate from *P. eurymedon*, and have been, indeed, united with this species by experienced Lepidopterologists, who visited the museum. Both specimens are in very bad condition.

I possess the chrysalis of *P. turnus, rutulus, daunus*, but there is no possibility to ascertain differences of value after the comparison of one or two specimens.

A gap is also for those species that the appendages of the genitals are unknown. This gap can only be filled in a manner to allow scientific conclusions when the appendages of *P. turnus* are studied in many specimens, to begin with fresh or living ones. Only after the extreme limits of variation for one species are known, a scientific comparison with those of the other species will be possible and will give reliable results.

PARNASSIUS.

Mr. Stretch collected one female July 23, in Colville Valley, W. T., between Little Spokane and Loon Lake where granite first appears. A second specimen was seen. Exp. 65 mm. The whole body below, the front and the thorax above and the extreme base of the primaries were thickly covered with intensely yellow hairs. The veins of the wings on the under side were yellow, and also the membrane when the insect was fresh had a decidedly yellow tinge. Species known with yellow hairs are *P. Eversmanni* and its female (*P. thor*, as I am informed by Mr. H. Edwards) and *P. Nomion*, Fischer. A detailed comparison of the figures and descriptions of *P. Eversmanni* do not allow to bring the female to this species. *P. Nomion* is much larger, but, indeed, the marks and the pattern of the wings are very similar. I have no female var. *Smintheus* before me agreeing with the female from Washington Territory. The excellent figures of Mr. W. H. Edwards do not contain one exactly alike, pl. 2, f. 2, seems to be the nearest to it. Mr. W. H. Edwards speaks of partial covering of the body with dirty yellow hairs by *P. smintheus*, and as the pouch differs not notably from this species, it will be considered better as an exaggerated variety of *P. smintheus*.

Later, in W. Montana, August 7, I saw not far from the stage-coach, before New Chicago, some specimens flying, with the appearance of larger males of *P. smintheus*.

NOTES ON ORGYIA LEUCOSTIGMA.

By N. Coleman, Berlin, Conn.

A few notes on the various changes observed during the growth of the larvæ of *Orgyvia leucostigma*, Smith, may not be uninteresting to the readers of "Papilio."

My attention was first directed to these changes in the summer of 1877, by finding some larvæ differing in color from Harris' description of this species. Harris describes the larvæ as "of a bright yellow color, sparingly clothed with fine yellow hairs on the sides of the body, and having four short and thick brush-like

yellowish tufts on the back, etc.," and with coral red retractile warts just back of these tufts. I need not give his full description, but only add that he said the caterpillars are found on rose bushes, apple and other trees and shrubs in July and August. Not knowing whether these belonged to a new species or to some variety, I watched for some eggs in order to experiment a little. I found some on an apple tree finally, and put them in a box, so that I could watch them from the time of their hatching. The eggs hatched out May 8, 1878. The larvæ were very dark-colored, head almost black, and showed some of the distinctive characteristics of this genus. They became lighter-colored after moulting. Nothing peculiar otherwise was noticed till June 14, when some of them moulted, and came out with *white* tufts on the back. Some of them pupated June 18, some June 19, but as they kept under the leaves during the latter part of their feeding, some might have retained the yellow tufts to the last, but some pupated while having the tufts white. My other duties prevented my watching them as closely as I desired, and I cannot say positively as to the number of times they moulted, but think it was five.

July 3 some moths made their appearance, both male and female, and as I wished for more fertile eggs to experiment further, I left them in the box. July 16 these eggs hatched, and the caterpillars obtained did not differ from those above referred to. Up to August 7 they had all lost the yellow tufts, except one, and that I put in a box by itself to see if sex had anything to do with the differences in color. One pupated August 14, and others the next day and the day following. August 15 the larva put by itself came out with white tufts, and pupated the 20th.

September 2 I found some of these caterpillars with yellow tufts on a rose bush and put them by themselves. By the next morning one of them had pupated and the others moulted during the day and gave me an opportunity to witness the operation. The caterpillar fastened its tail to the box cover, and in a short time the portion of the skin covering the head separated from the rest, and was soon detached by the head being curved under the body and rubbed on the box cover. The remainder split along the under side, and the caterpillar working its body back and forth, and from side to side, soon freed itself and came out with white tufts in place of the yellow ones it had previous to moulting. It seemed very much exhausted after the process. Some of the larvæ referred to August 7 changed back to yellow, and pupated in that coudition, coming out September 5. The one that pupated August 20 produced a female. Of the brood now under consideration about one male to every five females was produced, but in the earlier brood the proportion of males was larger. Nothing had been proved thus far as to whether sex had anything to do with the color of the tufts or other changes in the color, though at one time I thought I should be able to prove

that the larvæ which pupated with the tufts white would produce females.

I observed one change in some that pupated September 20 that I had not noticed before, Just before they underwent this change the stripes of yellow hairs along the sides became nearly white, but with a greenish tinge. September 10 and 13 I found *Orgyia* larvæ on pear, as also on apple trees, with white as well as yellow tufts, and one in which the yellow stripes had become greenish-white. The caterpillars found September 2 all produced females, There was a difference in size as well as in markings among the males obtained, some being larger than others; some with no light spot on the wings, and some much lighter-colored than others.

I found the larvæ still feeding on apple trees as late as October 8. A pupa found October 4 was full of eggs, showing that the eggs develop pretty soon after the caterpillar goes into the pupa state.

In November I put some eggs in a box to be ready for further experiment. May 19, 1879, these eggs hatched and the little caterpillars had blackish heads but with a tinge of red underneath. A cluster of eggs from which I expected to obtain *Orgyia antiqua* did not hatch. The larvæ of *O. leucostigma* were found feeding in orchards by May 20. Of those hatched in the box some had lost their yellow tufts by June 3, and I observed that those with white tufts had darker-colored bodies than the others. I again separated the white tufted ones from the others, but soon found both colors in the boxes, but the white ones had their heads as well as the warts on their backs orange-colored. June 6 I observed the most singular feature of all thus far noticed. One of the caterpillars had all the hairs on the back of a beautiful velvety black.

The *Orgyia* that hatched May 19 pupated June 17, and produced the imago June 29, showing quite a variation in the time these caterpillars remain in the pupa state. Some came out males, some females, showing that sex could not be determined by the color of the tufts.

June 22 the larva with the black tufts came out white, and the 23d it changed again to yellow. It pupated the 30th, and in due time produced a female.

September 6 I found several fawn-colored *Orgyia* on a hazel bush, but did not succeed in rearing them. The tufts on the back were darker-colored than the rest of the hairs. After all my observations, I have nearly come to the conclusion that *O. leucostigma* and *O. antiqua* are only forms of the same species. I know not positively, and shall make farther observations the coming summer. I have learned that it is not safe to draw hasty conclusions if I have learned nothing else.

PREPARATORY STAGES OF CATOCALA CARA, GUEN.

By G. H. French, Carbondale, Ill.

Egg.—Diameter .04 of an inch. In shape nearly globular, or a little flattened at the base; from this base to the middle the side is regularly curved. The top is a little depressed and contains a little button; from the middle to this depression the slope is straight instead of curved. Color olive brown, more greenish at first, with white striæ, below the middle these are equidistant, but above the middle they are in pairs, the base without striæ. Duration of this period 182 days.

Young Larva.—Length .15 inch, width .01 inch, width of head about .015 inch. Legs .12. Head and joint 1, rather pale reddish brown, shining; ocelli dark brown, joints 2 to 5 blackish brown, pale between the last two joints. Joint 6 is paler reddish brown than the head, the rest of the joints about the shade of the head except that the top of joint 7 is a little darker than the rest. The color on the joints from 6 to 12 is composed of four reddish-brown lines to each side, or eight in all, on a paler ground, the place of the dorsal line being pale. All the legs are whitish. There are small hairs over the body, apparently from the piliferous spots. Duration of this period 3 days.

After 1st Moult.—Length .20 inch. Ground color of body pale whitish-green, uniform throughout, the eight longitudinal stripes extending the whole length. Feet brown; tho first two pairs of prolegs showing as points about one-fourth the length of the others. Duration of this period 7 days.

After 2d Moult.—Length .33 inch. Color very dark brown or almost black, dorsal line whitish, one-fourth the width of the body in the middle, but narrower at the extremities, darker in the middle of joints 4 to 7. Subdorsal, suprastigmatal and substigmatal lines very narrow, feet a little paler than the body. Head concolorous, a white stripe each side of the middle of the face, clypeus and palpi pale carneous; the cheeks mottled with the same; jaws brown; the dorsum of joint 8 with a slight blackish elevation. Venter pale smoky-brown. There are about four more or less distinct wrinkles between the joints. Duration of this period 7 days.

After 3d Moult.—Length .90 inch. Head more distinctly heart-shaped than before. The whole body black with a series of crinkly whitish or yellowish-white lines, making the body striped with these two shades of color. On the dorsum the yellowish white predominates, below the subdorsal black is the prevailing color. The dorsal line is a series of long yellowish white ellipses with the central part black. Between this and the subdorsal line there are two distinct black lines and traces of a third between them in a series of black dots. The stigmata are in a black line; between this and the subdorsal there are three

black and three yellowish-white lines. Substigmatal line yellowish-white, rather distinct, below that mottlings of this and black hardly separable into lines. Piliferous spots rather prominent, orange, ten on joints 1 to 3, twelve on the rest; the black elevation on joint 8 more prominent than before the moult. It is jet black and situated between the posterior pair of dorsal piliferous spots. The posterior pair of joint 11 more prominent than the others. A brown hair from each of the piliferous spots. The upper prominences of the head orange, the face black and carneous white, a black median line with one from near the top joined to this running to the palpi. Thoracic feet pale-brownish, the first and second pair of prolegs pale carneous gray, the others pale orange bordered with black. Venter dull whitish with the centre of each joint black. Towards the close of this period the dorsum became paler than at its commencement. Duration of this period 4 days.

After 4th Moult.—Length 1.45 inches. Marked similar to the last period, the ground color pale straw-color, finely spotted with black dots, the subdorsal being some of these run more or less together so as to give the appearance of a line. The orange piliferous spots a little more prominent; the ridge on joint 8 elevated .03 of an inch above the general surface, in color orange and black and a blending of these two. Head and top of joint 1 the same as ground color, mottled with blackish carneous, a darker streak blended with orange from the upper lobes to the ocelli. Feet carneous. Duration of this period 6 days.

After 5th Moult.—Length 2.10 inches. Ground color and black dots the same as in the last period; the piliferous spots a little darker orange on the back, the two posterior on joint 11 more prominent, with a little reddish tinge and a brownish-black mark extending from the back of each to over the spiracle. The protuberance on joint 8 a little more prominent, pale orange spotted on the sides with black, the orange extending down the sides of the body between joints 8 and 9. Head same as before the moult, the dark orange stripe on the face bordered behind with brownish black; ocelli 6, three black and the three outer yellowish. The anal segment tinged with carneous. A carneous fringe each side of the body, just above the legs. First and second pairs of prolegs two-thirds the size of the others and used as legs. Venter orange, joints 6 to 8 each with a large black spot in the centre; spiracles gray, edged with black. Hairs on the sides gray, those on the dorsum black or gray tipped with black.

Mature Larva.—Length 2.35 inches; width of head .20 inch; of joint 7, .35 inch; height of tubercle on joint 8, .06 inch. Marked as at the beginning of the period, but the black dots are more intense in some parts than in others, so as to give faint stripes, the dorsal and one below the subdorsal light, the one above the subdorsal and the stigmatal dark. These are so faint

as not to be readily perceptible except in places. Other characters the same as at the beginning of the period. Duration of this period from 8 to 17 days.

Chrysalis.—Length 1.45 inches; depth through thorax .45 inch; through joint 1 of abdomen, .43 inch; joint 2, .44 inch, and from this gradually tapering to the tip. Wing cases extending over joint 5, the legs and antennæ reaching the same distance. Cephalo-thorax, wing and tongue cases coarsely shagreened, the abdomen finely punctured, the tip of the last joint very coarsely so. This ends in four hooks, two longer than the others, and two more hooks arising from the punctured portion at a little distance from the four. These hooks were fastened into a bunch of silk in the posterior end of the cocoon. Color dark brown, almost uniformly covered over with a white bloom. Duration of this period from 37 to 45 days.

The eggs from which the larvæ upon which the above observations were made were deposited October 6, 1881, from a female captured a few days before, 29 eggs being obtained. They were kept through the winter in a jelly dish and began hatching April 6, 1882, nearly all of them hatching that day. When first hatched they were very active and continued to be so during the first third of the larva period. They were first fed on the most convenient willow at hand, but this happened to be of a pubescent species which they refused to eat. This was not noticed till quite a number had died. A change to the young leaves of *Salix Nigra* proved more agreeable to their tastes and seven were carried through to the pupa state, six of these producing imagines. On opening the seventh cocoon some time afterward it showed that the moth had emerged from the chrysalis but had failed to get out of the cocoon. The cocoon is formed by fastening the leaves together with but very little lining, and that at the posterior end.

The larvæ hatched April 6th, and spun up May 11, 12, 18 and 20, respectively. The moths emerged June 23, 24 and 26, making the larva and pupa periods cover a little more than two months and a half. I have never taken this species in June, the usual time being from the first of August to the close of the season. There is scarcely time for the development of another brood from the last week in June to the first of August, and from this fact I am a little suspicious that the development of these was accelerated by confinement, though they were kept from any direct influence of the sun. Whether there is more than one brood in a season is a question for future observation. The parent moth was of the uniform brown type, but all the progeny were of the form *Carissima*, some males and some females.

SOME NOTES AND QUERIES ABOUT MOTHS. I.

By A. R. Grote.

Recently, in conversation with Mr. Henry Edwards, I spoke about some curiously neglected species of our moths, and my friend suggested that I should write out my remarks for "Papilio." This must be my excuse for the present gossipy paper, and I thought that its appearance now might be opportune in connection with the issue of the "New Check List," in the preparation of which I went over the literature concerning the species here mentioned. Some things which I find occasion to say may explain the synonymy of the "List" and supplement notes given in its pages; so upon this and other accounts it will be best to arrange my remarks under the heading of the different Families of moths.

I. Sphingidæ.

Ninety-one species of this family are cited in the check list and one of doubtful value: *Cablei*. Of this number one, *Procne*, will have to go, being probably founded on an example of the East Indian *Lucasii*. Instead, it is probable that Dr. Clemens' *Lyncea* is not the male of *Ficus*, as he suggested, but a distinct form. As we have *Ficus* from Key West, it is probable that its companion *Syces* (=*Inornata*, of Clemens and *Ficus* of Ménétries) will also occur in our territory. I have not identified *Cupressi* of Boisduval. The figure leads me to suspect an *Ellema* and perhaps we have to do with a variety of *Coniferarum*. The odd series of abdominal marks are not like *Ellema*. To the genus *Hemaris* must be probably referred two species described by Dr. Boisduval as *Etolus* and *Pyramus*; the latter, as Mr. Hy. Edwards suggests is probably=*Uniformis*, which is=*Ruficaudis*, Kirby, according to Mr. Walker. Mr. Walker's determination I am willing to consider correct, although Kirby's description has certain points of difference when compared with our species. *Gracilis* is a totally different species and does not belong to the same group with *Uniformis*. Mr. Hulst claims to have bred *Uniformis* and *Thysbe* from the same larvæ. He further unites *Buffaloensis* as a small and *Floridensis* as a large form or variety of the same species. As to *Buffaloensis* he takes no note that Prof. Lintner describes the larva, and also that the cell of forewings gives an apparent distinctional character. *Buffaloensis* is always a smaller insect than *Uniformis*, whether bred or captured specimens are considered, and a dwarfed *Uniformis* would still be distinguishable from *Buffaloensis*. The species are all near, *Gracilis* being the most easily identified, and they must be the subject of careful study before pronouncing decided opinions on the different forms, which are of extreme interest. The species of *Hemaris* will always be of uncertain standing until the larvæ are well understood. There was a distinct necessity for naming and

separating the different forms. Before we wrote upon them, all the different forms were called either "*Diffinis*" or "*Thysbe*," and though now there may be too many names, they must be carefully studied before being all thrown together again as varieties.

I close my notes on these *Sphingidæ*, by again explaining Dr. Boisduval's remark as to *Phaeton*, that we gave the name to the insect first in 1865, some two or three years before receiving specimens from himself, and that we were under the impression when we published this name that it was a MSS. one of his, which it now appears it was not, although the name given to an unpublished plate of the species when we described the insect in our Synonymical Catalogue. We again described the species and genus from Dr. Boisduval's specimen before the appearance of his name of *Erato*, which name, in his final work, Dr. Boisduval withdraws, and calls the insect *Phaeton*, which is its correct designation. The singular antennæ of this little Sphinx remind us of those organs in the still more aberrant form, *Arctonotus* of Boisduval,* and which I am the first to locate among the Macroglossians, I believe; in his last work Boisduval follows this example. The genus *Cautethia* replaces *Oenosanda* of Walker, there being already a genus *Oenosandra* when Walker published his name.

It contains three species, apparently, viz.: the type *Noctuiformis*, from St. Domingo, which I have examined, and which is certainly different looking from our South Florida insect, *Grotei* of Mr. Edwards. The Cuban species was identified by Dr. Herrich Schæffer as *Noctuiformis*, and he has figured it as such, but it is the same as our Florida form, very probably. The third species is Boisduval's *Spuria* from Mexico, larger but much like the other two. With regard to the queries as to our *Sphingidæ*, we have to find out the species described by Boisduval as *Pyramus*, *Etolus* and *Cupressi*, while the probability is that we have all three forms under other names. Mr. Butler's surmise that we did not know *Lugens* is incorrect, for at once I recognized its re-description as *Eremitoides* by Mr. Strecker. The student of the literature of the group will find that we were the first to recognize the character of the adhering scales on the vitreous fields of the wing in *Hemaris*, and that Mr. Strecker's accouut of the changing character of our views is fanciful. We were at first doubtful about the value of the character of the inner edge to the outer band on forewing, and hesitated to form species upon it. Now it is found that this character is reliable, but whether it characterizes dimorphic or true species is not clear. In the case of *Uniformis* we must admit, until Mr. Hulst's discoveries are contradicted, that it

*Incorrectly attributed to me in the Brooklyn List.

is a dimorphic form of *Thysbe* (*Pelasgus*). Among the species in the typical group of *Hemaris* not examined by me are *Senta*, Str. and *Metathetis*, Butl. As catalogued by me, I think the species are correct so far as our knowledge goes; I regret that I placed *Floridensis* as a variety of *Uniformis*, until more material is received. Our type is, I think, in Central Park collection. A specimen I received from Florida had the margin of the band like *Floridensis*, but the abdomen like *Fuscicaudis*. Was this a dimorphic form of *Fuscicaudis*, equivalent to *Uniformis?*

When Clemens wrote, *Ampelophaga*, Boisd., was an unknown species; but I found that this was the equivalent of *Pandorus*, wrongly called *Satellitia* by Harris. Clemens has left us another query, viz: What is *Deilephila oxybaphi?* described by him in the larval stage only. Kirby's species in Coleoptera, no less than Lepidoptera, do not seem easily recognizable from his descriptions. He has described a *Deilephila intermedia*, that most authors seem to think cannot well be our common *Chamænerii*.

On pages 44 to 45 of our Synonymical Catalogue we give the names of the doubtful species. Some of the species, such as *Scyron* and *Japix*, had been merely wrongly credited to our fauna by older writers. The debatable names at present are:

Deilephila intermedia, Kirby.
" *oxybaphi*, Clemens.
Pachylia Lyncea, Clemens.
Paonias pavoninus, Geyer.
Macroglossa Etolus, J. Leconte.
Macroglossa Pyramus, Boisd.
Sphinx Cupressi, Boisd.

Dr. Clemens' species of *Chærocampa*, described from specimens no longer in the Collection of the Academy at Philadelphia, are all extra limital. His *Macrosila Instita*, as published on page 14 of our Catalogue, is the same as *Ochus* of Klug, a species curiously neglected by Walker in the British Museum Lists.

With regard to the genera adopted in the "New Check List," they have been thoroughly tested so far as priority is concerned. I cannot find an objection to one of them and I think they stand upon a strong scientific basis and ought not to he disputed without grave cause. That in a few cases, as the genera allied to *Smerinthus* and *Chærocampa*, certain of them are of subgeneric rather than generic value, may be still a matter of dispute. I think the student will find that this can only be properly questioned of two or three, and that, although there may be some prejudice against them, more will be lost than gained in lumping the species all together again. As they stand, they fall in with what has been observed by a student of the Sphinxes of the world, such as Mr. Butler, and, in great part, Dr. Boisduval. Where I differ from Mr. Butler, as in adopting *Dilophonota*, nearly

identical in time of publication with *Anceryx*, I do so because Burmeister's genus is more limited in extent and is conceived in the sense in which I employ it. Hubner's genus *Phlegethontius* is equivalent to *Macrosila* as used by Dr. Clemens; the type of the latter seems different and the older name is used for properly associated species.

When we compare our fauna with that of Europe, we find that it is twice as numerous in species—91 to 40. Ours contains no true *Macroglossæ* of the type of *Stellatarum*, and no species of *Acherontia*, though loose writers such as Maasen have credited Mexico with a species of the latter genus.

In the European genus *Deilephila* we are poor, having but two, representative of two European species, *Livornica* and *Galii*, but apparently sufficiently distinct. In the clear-winged Macroglossæ, belonging to *Hemaris* (and its subgenus *Hæmorrhagia*) we have many forms against two in Europe. In the typical Sphinges, genus *Sphinx* (=*Lethia*), of which *Ligustri* is typical while *Convolvuli* is to be referred to *Phlegethontius*, we are rich in closely allied species against one in Europe. We have at least one true *Smerinthus* from California, congeneric with the European *Ocellata*. Our species from the East diverge from this type and resemble the species *Kindermanni* of Lederer from Asia Minor; again we have in *Versicolor* a representative of the genus *Ampelophaga*, also from Eastern Asia. In *Calasymbolus*, *Paonias* and *Cressonia* we have three American structural types of *Smerinthi*, while *Triptogon* has a great number of Eastern Asiatic species, hardly more than races, so near do they run together.

Our fauna comes mainly from the South, whence we receive the Chœrocampid forms. *Pachylia*, and perhaps *Argeus*, may breed in Florida and Southern Texas. The specimens taken occasionally on the coast and up the valley of the Mississippi are probably immigrants from the West Indies or Mexico. The *Manducæ* come to us largely from the South, and *Phlegethontius* is more numerously represented in South America. *Amphonyx Antæus* may be only an occasional visitant at Key West; the genus is West Indian and South American.

From Western and Northern Asia we receive *Hemaris*, *Deilephila*, *Smerinthus*, *Triptogon*, *Hyloicus* and *Sphinx*, though the development of the latter genus is North American. From the South we receive *Aellopos*, *Cautethia*, *Amphion*, *Enyo*, *Philampelus*, *Argeus*, *Pachylia*, *Daremma*, *Diludia*, *Amphonyx*, *Phlegethontius* and *Dilophonota*. With Eastern Asia we have *Eusmerinthus* and *Ampelophaga* in common. Genera peculiar to our fauna are *Lepisesia*, *Euproserpinus*, *Thyreus*, *Deidamia*, *Arctonotus*, *Everyx*, *Paonias*, *Calasymbolus*, *Cressonia*, *Ceratomia*, *Dolba*, *Ellema*, *Exedrium;* as a rule, genera containing single, compara-

tively striking and isolated forms. We may tabulate them as follows:

Genera of European and Asiatic Extraction.

	No. Species.
HEMARIS (typical)	10
DEILEPHILA	2
AMPELOPHAGA	1
SMERINTHUS (typical)	1
EUSMERINTHUS	2
TRIPTOGON	2
SPHINX	15
HYLOICUS	3
Total	36

This number loses its importance when we examine the species themselves. The forms of typical *Hemaris* are probably a little overstated. The development of *Sphinx* is *American*, rather than *European*. In Europe but one species, *Ligustri*, occurs. Our forms on my list, down to *Canadensis*, seven in number, are probably strictly typical; the remaining eight depart more or less, some approaching *Hyloicus*, however, a European type. Again, others are peculiarly American in appearance, but hardly give generic characters, such as *Gordius*, *Eremitus*, *Dollii*. On the whole, then, we have eight generic types coming from the Old World, the kinds of two of them, *Hemaris* and *Sphinx*, having multiplied and developed upon American ground. These types may be held as coming from the North, and as related to a former Circumpolar fauna.

Genera of Southern American Extraction.

NAMES OF GENERA.	*No. Species.*
AELLOPOS	2
CAUTETHIA	1
AMPHION	1
ENYO	2
PHILAMPELUS	4
ARGEUS	1
PACHYLIA	1
CHŒROCAMPA	1
DAREMMA	3
DILUDIA	3
AMPHONYX	1
PHLEGETHONTIUS	4
DILOPHONOTA	6
Total	30

We have thus thirteen generic types from the South, and although the species are less numerous than in the genera of Old World extraction, I have explained this circumstance away,

and this present category of our Sphingid genera includes the most powerful element in our fauna.

Genera peculiar to North America.

Names of Genera.	*No. of Species*
Lepisesia	1
Haemorrhagia	4
Euproserpinus	1
Thyreus	1
Deidamia	1
Arctonotus	1
Pogocolon	4
Everyx	2
Paonias	1
Calasymbolus	2
Cressonia	1
Ceratomia	1
Dolba	1
Ellema	3
Exedrium	1
	25

I think that the study in this way of the members of any one lepidopterous group will lead to interesting results. But such are only attainable when the material has been closely studied and arranged as I have tried to do with our *Sphingidæ*. Since my studies in the synonymy of the family, the results of which appeared in 1865, I have kept working on the genera and think these, as given in the "New Check List," have acquired a comparatively stable and final condition which will allow of conclusions as to geographical distribution being safely drawn. Especially interesting are such groups as *Hæmorrhagia*, which is an American development of an Old World type *Hemaris*, influenced apparently in the extension of the thorax by such South American types as *Aellopos*. But so long as writers call all or most of our *Caudiberbes* species of *Macroglossa*, it is evident that an erroneous idea is given at the outset to our fauna, which does not contain a single form really belonging to that Old World genus.

While the neuration is not greatly varied in the *Sphinges*, I find that it is most varied in the *Smerinthi*. Good characters are offered by which we may, for instance, distinguish *Cressonia*, in every way a strongly marked and peculiar form. That there is in this group considerable variation in antennal structure also is noticeable. We shall find that *all* the appendages vary in ultimate structure, accordingly as a group is plastic or subject to differences. The position of the wing in repose is also unusual in the *Smerinthi*, the hind wing being pushed upwards; several of the species look like curled and brown leaves. They are less obvious and more sluggish than the other *Sphinges*. Our most beautiful species is, I think, *Calasymbolus Astylus*.

Our greatest rarities from the East are *Flavofasciata*, *Cerisii*,

Luscitiosa and *Jasminearum*. The first named is taken in Canada, Northern New York and Maine, the last will probably be found more abundantly southward. The larva of *Catalpæ* has turned out to be very numerous in various localities in the South, but the Moth has proved difficult to rear. With several other Sphingidæ, I took *Versicolor* twice at sugar near Buffalo, N. Y.; from its flight I could easily tell it from *Myron* and *Choerilus*, which came abundantly to bait, but it was harder to "bottle." It had a different way of taking the bait from the difference in tongue. *Hageni* has been taken in some quantity in Kansas by Professor Snow, and seems to occur throughout the Southwest as well as in Texas; I have not heard of its being found near the Atlantic seaboard. Our commonest species seems to be *Lineata*, after this, *Celeus*; *Abbotii* is also very well distributed. The species of *Hemaris* are more local; *Thysbe* is found over the widest territory. Mr. Hy. Edwards speaks of *bushels* of *Achemon* larvæ found in California on the vines; it is rarer in the East, but on Staten Island vineyards it was more usual than *Pandorus*. Of late years *Inscripta* has become rarer. *Labruscæ* has been found as far North as New Jersey, borne on the winds from more southerly latitudes.

In his "Synopsis of North American Sphingidæ," a work somewhat ambitious in appearance, but not evincing a corresponding study of the literature of the group, Dr. Clemens describes the following species, which are not generally known:

Calliomma Volatica from Brazil; *Deilephila oxybaphi* (larva) from Penn.; *Chærocampa Procne* said to be from California, but probably = *C. Lucasi* from East Indies; *C. Thalassina*, of which Butler says: "Seems to be allied to *Amadis*;" *C. Versuta* from Mexico. Butler seems to have overlooked *Calliomma Volatica*. Whether the type has gone the way of that of *Procne* I do not know, but it is certainly probable.

THE PREPARATORY STAGES OF ARCTIA NAIS, DRURY.

By G. H. French, Carbondale, Ill.

Egg.—Diameter, .03 inch, color, white; an obtuse cone, about as high as wide, flat at the base; smooth. These were found on a ripe strawberry in a single cluster, hatched 5 days after finding. They had the appearance of being freshly deposited so that it is probable this period is from 5 to 6 days.

Young Larva.—Length .06 inch, color dull pale gray, head black on the cheeks, a triangular space above the mouth of the same color as the body. On each joint there is a transverse row of tubercles, six distinguishable, black, from each arises a black

hair as long as the thickness of the body. Feet 16. Duration of this period 6 days.

After 1st Moult.—Length .10 inch. Ground color similar to that of the preceding period; the tubercles dark brown instead of black, more than one hair from each. Head as before. Duration of this period 8 days.

After 2d Moult.—Length .20 inch. The only change aside from size is that the ground color is a little darker, and there are more hairs in the fascicles arising from the tubercles than before the moult. They are more active than they have been before. Duration of this period 6 days.

After 3d Moult.—Length .45 inch. Ground color leaden gray; dorsal, subdorsal and substigmatal stripes white. In the middle of each joint the subdorsal is orange, and there is also an orange spot just below this, above a tubercle. There are 10 tubercles to each joint distinctly visible now; the tuft of short hairs arising from each is black above but gray on the sides. Head black. Towards the close of this period the following changes were noticed: Ground color dull black, a little paler on the sides and venter; dorsal line yellowish white, subdorsal and substigmatal blackish; joint 1 somewhat lighter than the others. Head and thoracic feet jet black; prolegs pale, at the tip, orange spots on the sides dim. Duration of this period 7 days.

After the 4th Moult.—Length 1.00 inch. Color uniform black, the head shining, sides of the prolegs pale, and an indistinct pale dorsal line. As before, the fascicles of hairs from the dorsal tubercles black, those from the sides brown; those on joints 1 and 2 all brown. The interior part of the neck is reddish. Duration of this period 7 to 8 days.

After 5th Moult.—Length 1.70 inches. Color of body, tubercles and hairs as before, with the exception that the hairs on joint 2 are black, on the dorsum. Dorsal line nankeen yellow, faint on joints 1 to 3 and 11 to 12, but on all of the others distinct and expanded somewhat in the middle of each joint, those in the middle of the body expanding most; stigmata, orange. Head and thoracic legs brownish black; the prolegs brown, not very dark; venter slate color. No trace of any lines but the dorsal.

Mature Larva.—Length from 1.65 to 1.70 inches; width of head .15 inch; of middle joint .28; between joints .20; head brownish black, clypeus, palpi and antennæ whitish, the tips of the latter black; color of body and dorsal line as at the first of the period, as also the tubercles and hairs; 10 of the tubercles to each joint. All the other points as given before. Duration of this period from 3 to 11 days.

Chrysalis.—Length .75 inch, from anterior end to end of wing cases .43 inch, these not reaching quite to the posterior part of abdominal joint 5; antennæ and leg cases .35 inch from end.

Depth, thorax .25 inch; abdominal joint 2, .27; joint 3, .30; joint 4, 31; joint 5, 28; joint 6, 27; joint 7, 25. From the posterior part of joint 8 it tapers rapidly to the end. In shape nearly cylindrical, the bulge in joints 3 to 5 being mostly dorsal. The last joint terminates in 10 hooked, brown bristles in two clusters; the tubercle supporting these is striated longitudinally. Anterior portion rounded, the prothorax containing two slight elevations covered with short hairs. Color black. Head and thorax finely granulated, the first four abdominal joints punctured with a few larger depressions, mostly smooth and shining. Duration of this period from 11 to 12 days, one day devoted to spinning in addition to this.

As intimated before, the larvæ from which the above descriptions were taken were obtained from a cluster of eggs found on a ripe strawberry. There were 29 of the eggs, but only two larvæ were reared through all their changes. The eggs were found May 20, 1882; the first moth appeared July 13, the second, July 22, making a total period of from 54 to 63 days, or about two months. From captures for several years I had supposed the species to be two brooded, one in May from larvæ that hibernated and one in September, but a two month's period from egg to moth will give us three broods in a season, one in May, one in July and one in September. I have this year found them in July and the first of August, though I had not noticed them before.

The specimens reared from these two larvæ were first a ♂ of the form *Phalerata* figured in Harris, and second form *Nais* a ♀; though this can not be altogether a sexual variation, for my other specimens of this form are males. The male answers well to Harris's figure and description of *A Phalerata*, having "the hind wings next to the body, and sides of the body, reddish," the general color of the wing being reddish, but not so much so as next to the body. The costal margin of hind wing is black, with two small spots along the outer margin. My cabinet specimens vary from two to four of these spots. The second form or the ♀ has the hind wings more distinctly red, a black costal margin to which is joined a discal dash and large apical spot, and a long angular spot below the apex on the outer border. Further along in the outer border towards the anal angle are two large, nearly round, black spots joined together. This seems to answer to Dr. Morris' description of *Nais* with the exception of the color of the hind wings. All my males of this form agree nearly with this in marking, but the ground color of the wing is lighter. I have not Drury's plate or description by me, but may say that this corresponds with another ♀ *Nais* identified for me by Mr. A. R. Grote. Of course there is a bare possibility that the cluster of eggs on the strawberry was deposited by more than one moth, but there is not much probability, as they were in a single cluster. If we take it for granted that the two forms had a common parentage,

then there is no longer any doubt of the identity of *Nais* and *Phalerata*.

With regard to *A Decorata*, I cannot as yet say as much. I have for some time regarded this as a form of *Nais*, but this season I have reared it from the larva, and found that it differs from the larva from which *Nais* was raised, as the following brief description of larva of *A Decorata* when full grown will show: It is black, rather thick, ten tubercles bearing clusters of hairs to each segment, the second and third on each side from above dark orange of rather a smoky hue, the tips black. Part of the hairs on the sides and all of those on joint 1, top as well as sides, are brown, the rest are black. Stigmata bright orange; no dorsal line. From this it may be seen that the identity of this with the others is a subject for future investigation.

TWO NEW SPECIES OF THANAOS.

By W. H. Edwards.

THANAOS TATIUS.

Male.—Expands 1.6 inch.

Upper side of primaries umber-brown, blackish on disk and to base, the outer limb free from white scales; on outer edge of disk towards costa a light brown patch; on costa four sub-apical silvery dots, in zigzag line; one such dot in upper median interspace, and one, rather obscure, against end of cell; along hind margin a row of small patches of bluish-white scales; the usual (in this genus) extra-discal band is made up of large lanceolate and elongated black spots, separated, each edged on the outer sides by bluish-white scales, which scales form a conspicuous serrated line across the wing.

Secondaries black-brown with an indistinct series of lighter patches beyond the disk; fringes of primaries concolored; of secondaries white, cinereous at outer angle.

Under side of primaries lighter, the spots repeated, the one against cell distinct; along hind margin a row of white points, and at inner angle a white patch; beyond the disk an indistinct series of whitish patches, almost obsolete in the middle of the wing; the apical area dusted white. Secondaries uniform blackish-brown; along the edge of hind margin a macular white band, represented by dots on the upper half.

Body above dark brown, beneath same, but the thorax with many dark grey hairs; legs dark brown; palpi brown with dull white hairs interspersed; antennæ black, on the underside ringed white; club black above, the under side and tip ferruginous.

From a single male.

This fine species is readily distinguished from any of the

white-fringed allies by the pure brown color of the marginal area of primaries, with no dusting of white, and by the conspicuous extra-discal band and its whitish servated edging.

THANAOS CLITUS.

Male.—Expands from 1.5 to 1.7 inch.

Upper side of primaries umber-brown, so much dusted with whitish scales and clothed with white hair as to discover the ground color only in small patches, as along the hind margin, and also a little within the margin and on basal area; the usual extra-discal spots are black, on the upper half the wing long, acute, below broad, lanceolate; on middle of disk a broad, black cross-band, reaching inner margin, and the basal area is mottled with black; a clear brown, but not well defined patch, at end of cell; on costal margin four sub-apical diaphanous dots, three in straight line, the fourth a little inside; a similar dot in upper median interspace, and one at the end of cell. Secondaries uniform black-brown; fringes of primaries black-brown, of secondaries white, cinereous at outer angle.

On under side the spots are repeated, a little enlarged; primaries have a marginal row of white points, sometimes meeting; also an extra-discal series of light-brown patches more or less dusted with white scales; in some examples, however, these also are wanting, unless next inner margin, and the whole limb is thinly dusted white, through which runs a submarginal series of brown patches; in all cases there are many white scales over apical area.

Secondaries immaculate, except for a few whitish points along posterior part of hind margin, which sometimes are developed into a white macular band.

Body above black-brown, thorax and abdomen beneath grey-brown; legs dark brown, with ferrginous hairs on under side; palpi dark brown, the tips of the hairs whitish; antennæ black, on under side slightly annulated white; club black above, ferruginous below and at tip.

From 6 ♂.

This species is allied to *Tristis*, Bd.

NOTES ON LEPIDOPTEROUS LARVÆ.

BY A. S. PACKARD, JR., M.D.

The following larvæ were collected during the past season in Maine, while engaged in collecting material for a revised and enlarged edition of Bulletin No. 7 of the U. S. Entomological Commission (Insects injurious to Shade and Forest Trees), which is to form the Fifth Report of the Commission to be prepared under the direction of the Commissions of Agriculture. The writer would here ask aid from lepidopterists in the way of specimens and notes concerning any insects found on any kind

of forest or shade tree, in order to render the work as complete as possible.

Lycomorpha Pholus, Harris. Body cylindrical, long and slender, with five pairs of abdominal legs. The head is deeply bilobed, each side large and smooth, black mottled with horn-color. The body is provided with numerous tubercules from which arise long black dorsal or paler lateral hairs, which are a little longer than the diameter of the body; each segment is beset with 16-20 of these small hair-bearing mamillæ or warts. The general color of the body is horn-brown; the thoracic and abdominal legs of the same color. The tubercles at the end of the body are paler than elsewhere, making the end of the body appear above as if speckled with white. Length 15 ^{mm}

The pupa is short and rather thick, the end of the body very blunt, with no apical horns or tubercles. Length 10 ^{mm}

The caterpillar was found late in July, wandering about at Phipsburg, Me. Without doubt the food plant is lichens, as we have caught the moths in Maine, in former years, flying about lichen-covered rocks. The caterpillar we captured spun, July 31st, a thin silken cocoon with scattered black hairs on the outside. It changed to a pupa August 4th, and August 20th or 21st the moth appeared.

Acronycta occidentalis G. & R. The larva of this moth was observed wandering about at Providenee on September 21st. The body is cylindrical, hairy, with a black hump on the 8th segment, and a broad black longitudinal band. The general color of the body is a livid leaden hue. The larva began to spin a cocoon September 23, the moth appearing early in the following summer.

The pupa is 20 ^{mm} in length, of the usual form; the tip of the abdomen is obtuse, with eight long, even, stiff chitinous setæ which are incurved at the end. The basal abdominal suture is well marked, being very deep.

I am indebted to M. Grote for the identification of this and the species of Hypena.

Hypena baltimoralis Guen. The larva of this species was common on the red maple at Brunswick, Me., early in August. The body is very slender, and at first sight it must be regarded as a geometrid. The body is cylindrical, slender, tapering considerably toward the long anal legs, which are outstretched. The segments are moderately convex, the sutures being very distinct. The head is rather small, smooth, somewhat bilobed. All the legs, both thoracic and abdominal, are of the same color as the body, which is pale pea-green, of the color of the upper side of the leaf of the red maple, but slightly paler. The sutures between the segments are often straw-yellowish. The body sometimes has a slight purplish tint, the head remaining green. Length 22 ^{mm}

August 5th one began to spin a cocoon, the pupa appearing

the 7th. It is dark chestnut brown in color. The moth issued August 17th.

Dichelia sulphureana Clemens.

Body tapering towards each end. The head is honey-yellow, considerably narrower than the body. The body is pale livid green with a corneous hue. There are no lines or any distinctive markings except the four usual warts or small tubercles which are arranged as usual in this family in a trapezoid. From these warts arise hairs one-half as long as the body is thick. At the end of the supra-anal plate is a flattened tubercule with spines. Length 15 m. m.

Common on *Pinus strobi* at Brunswick, Me., and also found on *P. rigida* the first week in August.

August 5th it began to make a slight cocoon by drawing together the leaves into a rude tube and spinning a slight cocoon between them. The pupa was found between the leaves August 7th. The moth appeared August 16–17th.

It agrees well with Robinson's Pl. V., fig. 37, though differing in some respects. According to Fernald's Catalogue of Tortricidæ, this common species feeds on the clover, Vitis, Ranunculus acris, and is an inquiline in willow galls.

Teras ferrugana, S.V. The larva was beaten from the white pine (*P. strobi*) at Providence, October 5th. The body is rather large, 20 ^{mm} in length, broad and flat. Head flattened, held out horizontally, reddish above, with a dark broad line around the edge. The body is green, with a reddish tint. The cervical shield is concolorous with the body and edged behind with dark black-brown, forming a curved line. Over the body above are scattered pale flecks.

The caterpillar pupated in the bottom of the breeding box, without making any cocoon. The pupa is slender, 8 ^{mm} in length, of the usual pale horn-brown color. Each abdominal segment is provided with two dorsal transverse rows of close set spines. The tip of the abdomen is suddenly truncated, compressed from above downwards, the edge is hollowed within, the edge itself curvilinear, with a small spine on each side.

The moth appeared October 20th or 21st. I am indebted to Prof. C. H. Fernald for kindly identifying it. According to his Catalogue of Tortricidæ of North America, this common European species feeds in Europe on the beech, birch and oak (Heinemann), and, according to Walsh, is in this country an inquiline in galls of *C. Salicis strobiloides*. It could not have been mixed with other Tortricids in my breeding tin box, as it was the only Tortricid in the little box, hence I think there is no doubt but that it at least occasionally feeds on the white pine. The larva is very characteristic and easily recognizable.

I have reared Tortrix (*Cacœcia*) *rosaceana* Harris, from *Betula*

populifolia, the moth appearing in Maine, September 1. I have also raised *Thera contractata* Pack., from a pupa beaten out of the hackmatack, the moth appearing the first week in September.

SOME NEW NOCTUIDÆ AND NOTES.

By A. R. Grote, A. M.

Spragueia magnifica, Gr.

Base of fore wings very pale yellow, with a dark basal, mesial, longitudinal stripe sprinkled with chalybeous scales; internal margin also narrowly striped. Median space defined by outwardly oblique orange line, fusing with an outer orange line or band, exerted superiorly; the median space is thus narrowed inferiorly; ground color whitish or pale yellow; the small chalybeous discal spots are surrounded by the orange inferior shade of median space; a subterminal black band, edged with and surmounted by orange; terminal space pale yellow before the dark fringes. The smallest and most beautifully marked of the genus. Arizona, coll. B. Neumoegen, Esq.

This species differs from *Leo* by its smaller size, the narrower subterminal plumbeous band, widening a little inferiorly, which is not indented or broken; the even, curved edge to the pale basal field comes down to the margin at middle of wing; the costal black dots are absent; the submedian pale streak of the ground color at base is much wider, the inner margin here being only narrowly plumbeous. A most beautiful and vividly colored insect, very near *Leo*, but quite distinct on examination.

Spragueia Inorata, n. s.

A small, inconspicuous species, with the usual dark spots and bands absent. Ochrey orange, dull colored; reniform, an open ringlet, orbicular a minute dark point. Median space wide. Traces of the pale median lines, the t. a. nearly straight. Fringes slightly soiled inferiorly. The wing is darkest along internal margin and on terminal margin irregularly. Hind wings pale fuscous, subtransparent. Head and thorax like fore wings. The color is a pale buff-yellow, the darker shading somewhat dull ochrey orange. Texas. One specimen, coll. B. Neumoegen, Esq. This form approaches *Tarache*, slightly, in appearance.

Besides comparative details as to the ♂ genitalia and antennæ, the genus *Spragueia* differs from *Erotyla*, by the narrower primaries, which are also proportionately longer; the longer vein 9, and the different origin of 7 and 8, while the hind wings are only 7-veined, its European genus having them 8-veined. The ornamentation is different in pattern, and the American genus contains a number of little Tortricid-like species, the European having only one, comparatively broad-winged, more like *Erastria*. The genus comes to our fauna from the South, and our Cuban

and West Indian species are congeneric; *Pardalis* from Florida is, I think, described also from the West Indies, but I have not been able to compare types. The difference in the neuration of hind wings alone is a generic character quite remarkable and constant, so far as I have examined the species.

EUSTROTIA DISTINCTA. n. s.

Size of *Apicosa*. Distinctly marked with black and white. Base of wing blackish to tremulous black t. a. line, behind which is a following uprighe white shade band. Ground color obscure grayish olivaceous . this obtains on median space outwardly, and encloses the small pale reniform. T. p. line much exserted and irregular. A black apical patch with a white shading between it and t. p. line. Another on internal margin before the angle, edging the t. p. line outwardly. Hind wings fuscous, with an ante marginal shade, like *Apicosa;* beneath paler, with double shades and dot. Fore wings pale along terminal margin beneath. Above, the black apical patch is partially cut by the pale s. t. line. One good specimen. Coll. B. Neumoegen, Esq.

PROTHYMIA PLANA. n. s.

Smaller than *Coccineifascia* and without the band. Fore wings dark yellow with contrasting pinkish-red fringes. No markings. Hind wings translucent stramineous. Beneath all pale yellowish, as is the body. On primaries beneath the fringe is discolorous. One specimen. Arizona. Coll. B. Neumoegen, Esq. So simply marked as to be easily known.

NEUMOEGENIA POETICA. Grote.

In describing this species I omitted to state that the costal region of primaries above was broadly white. It might be assumed from the rest of the description, as the ground color is given as "white," and the species is so simply marked and striking, no confusion could occur from want of detailed remarks.

EUSTROTIA PROPERA. Grote.

A second specimen shows traces of the blackish subterminal line, marked on costa, and the terminal space is centrally soiled with blackish. The fringe is dusky. This minute form can be confounded with no other ; it belongs to the *Apicosa* series.

Genus PLAGIOMIMICUS.

Front with a large, deep, empty cup, extending beyond the facial vestiture and thus completely exposed. In *Polenta*, the globose clypeus is surmounted by a shallow excavation with a slight central protuberance. In *Basilodes* there is merely a wrinkled prominence, the rim of which is hardly raised ; this holds for the second species, *B. Chrysopis* ; in which it is a little smaller. In *Stiria* the prominence is somewhat cordate, with better defined edge, and there is a button-like protuberance inferiorly where the base is indented. This holds for *Stiria Sulphurea*, Neum., except that the protuberance is pushed in a little without being central ; the excavation itself is a little more circular and smaller. In the

two species of *Stibadium* the front is much as in *Basilodes;* in *Aureolum* Hy. Edw., an exquisite species, the excavation is a very little deeper and smaller than in *Spumosum*, in both partly concealed. In *Stiria* the patagia are prominently deflected. I find the labial palpi much longer in *Basilodes*, as compared with *Stibadium*. What Mr. Smith says as to the relationship of these genera is partly correct; I have overlooked the *resemblance* which *Basilodes* bears to them, but I should not unite them; each has some distinguishing points and *Stiria*, especially, somewhat strongly departs. *Basilodes*, *Stibadium*, *Stiria*, *Plagiomimicus* and *Polenta* belong to a group, oscillating between *Calpe* and *Heliothis*, which I have called *Stiriinæ* in the New Check List.

But, contrary to Mr. Morrison and Mr. Smith, I demonstrate the presence of a tibial claw in *Polenta Tepperi*, from an Arizonian specimen in coll. B. Neumoegen, Esq. The difference between *Polenta* and *Plagiomimicus* is thus confined to a modification of clypeal structure. It is not more distinct from *Basilodes* than the other genera. Mr. Smith accuses me of "resurrecting" *Trigonophora;* if he will look in Lederer, he will see that I took the genus from Lederer, and that I have followed this most distinguished authority in using Hubner's genus. In two very important statements I find Mr. Smith thus quite wrong. I shall allude to others. Mr. Morrison's statement that *Polenta* had unarmed tibiæ always seemed to me doubtful from the great resemblance between *Polenta Tepperi* and *Plagiomimicus Pityochromus* (*Media Morr.*) in shape and ornamentation. The genera are not sufficiently distinct. Consult Bull. B. S. N. S. Vol. 3, pp. 75–76, 1875.

PLAGIOMIMICUS EXPALLIDUS. n. s.

Wings pale olive ochrey with the s. t. line white-edged on costal region, margining outwardly the costal, dark triangular shade. T. p. line oblique, even, edged with white inferiorly. Median space somewhat yellowish and darker inferiorly. Stigmata lost in the pale shading of the discal cell, which shows a dark dot in the middle. Hind wings whitish. Smaller and differently colored, of a faded hue compared with the dark *Pityochromus*. Montana, Coll. B. Neumoegen, Esq. Expanse 26 mil.

Genus CAPIS, *Grote.*

A Deltoid genus with broader and squarer wings compared with *Sisyrhypena*. Antennæ (♂) simple, ciliate. Vestiture flattened, hairy, very silky. Eyes naked, tibiæ unarmed as usual in this group. Ocelli; eyes unlashed. Body slender, untufted. Abdomen not exceeding secondaries. Labial palpi loosely held, exceeding the front, third article short, second with longer and thicker scales. Tongue rather weak.

CAPIS CURVATA, *Grote.*

A rather small species, deep brown on primaries to the curved s. t. line running from apices downward somewhat obliquely

to within internal angle; outside of this the wing is paler. Hind wings dark fuscous. Head and thorax dark brown. A male, received from Mrs. Fernald, taken at Orono, Maine. Previously I only had the female. The species is nearly concolorous, and may be known by the curved s. t. line.

AZENIA. n. gen.

Vestiture flattened hairy. Eyes naked. Form very slender, like *Spragueia*, wings narrow, long, primaries widening a little outwardly. Antennae simple. Legs unarmed, thinly scaled. Front with infra-clypeal plate prominent, but overshadowed by a parallel, long, distinctly tridentate, flattened, clypeal protuberance. Labial palpi closely scaled, a little longer than in *Xanthoptera*.

AZENIA IMPLORA. n. s.

Pale lemon yellow. Two ochrey dots in place of t. a. line. A median ochrey shade band, irregular and faint. One or two dots in place of t. p. line. Minute points at base of pale fringes. Hind wings white. Beneath whitish; costa of fore wings a little clouded. Head and thorax like fore wings. Abdomen pale, a little exceeding secondaries. Arizona. coll. B. Neumoegen, Esq. The armature of the head is disproportionately large.

XANTHOPTERA CLAUSULA. n. s.

Allied to *Semiflara*, but much smaller. Thorax and base of primaries bright lemon yellow. A fine white line, perfectly straight, divides the yellow base from the leaden outer field which is delicately frosted with white, and encloses a vague white cloud-like spot, the reniform. Fringes interrupted with pale yellowish above internal angle, outwardly. Hind wings translucent fuscous. Abdomen pale. Beneath pale, glistening, with reflected darker shades on fore wings. Arizona, Coll. B. Neumoegen Esq.

The labialpalpi are short; front globose. Eyes large and naked. Agrees with *Semiflava*, which I have left with the type of the genus *Nigrofimbria*, in *Xanthoptera*.

ESCARIA. n. gen.

Wings frail, wide, abdomen untufted, a little longer than hind wings, body slender. Labial papi short. Eyes naked, unlashed. Front with a moderately prominent, rather wide, cup-shaped protuberance, nearly hidden by the erect vestiture and with a central protuberance, not reaching over edges of cup, set in erect vestiture which fills the cup itself. Vestiture mixed, flattened hair and scales. Legs apparently unarmed. Seems to fall in between the *Tarache*-like genera and *Eustrotia*. Size of *E. Carneola*.

ESCARIA CLAUDA. n. s.

Grayish fuscous. In the ♂ the ornamentation is better written. Orbicular paler, spherical. Claviform moderate, its upper edge accentuated in black. Reniform moderate, lunate. Lines fine, perpendicular, edged with pale or whitish, especially

in ♀, which is darker, and the white s. t. line quite prominent. Hind wings pale fuscous, trace of median spot and extra mesial line; a vague terminal band. Beneath grayish fuscous, with common line and faint discal spots. Four specimens, one with a reddish tint which seems a variety. Arizona. Expanse 20 mil.

Coll., B. Neumoegen, Esq.

PREPARATORY STAGES OF *SEIARCTIA CLIO*. PACK.

By Dr. Hermann Behr.

I do not know if the metamorphoses of this rare insect are known, and I therefore deem it an entomological duty to publish what a lucky chance has revealed to me on this subject. We are indebted for this interesting discovery to Mrs. Curran, wife of Dr. Curran, the well-known author of valuable works on Microscopic Botany. Five caterpillars were brought to me by Mrs. Curran, resembling most those of a species of *Halisidota*—in fact, they were so like those of the *Halisidota* of the oak (*H. Edwardsii*) that I at first thought them identical, but I afterwards observed that the hairs do not spring in a stellate form from tubercles as in *Arctians and Lithosians*, but that they grow in bushes like those of the larvæ of *Halisidota*, and of the European *Syntomis Phegea*, and the tufts were combed backwards as in *Ecpantheria scribonia*.

The food plant was *Apocynum androsæmifolium*. The larvæ were full grown when I received them, so I cannot judge if they would eat other plants of the *Apocynum* or *Asclepias* group. I tried *Vinca* and *Nerium* without success.

On the 20th of May the first began to spin and formed a web exactly like that of *Halisidota*. On the 12th of July I found in the breeding box a pair of *Seir. Clio*, the following day another, and on the 18th a single female.

The history of this transformation confirms my idea of the systematic position of *Seirarctia* and *Ecpantheria* being near *Halisidota* and *Syntomis*, to which genera also the neuration of the hind wings of the present insect bears a very close relation.

NOTES ON LEPIDOPTERA.

Larva of Amorbia humerosana. Clem. Body thickest near the middle, uniformly yellowish green, with a few scattered whitish hairs. Thoracic plate green, a curved lateral black dash on the first segment. Head pale brown, greenish in the centre, with a lateral black dash. Thoracic and abdominal legs and feet concolorous with the body, the anal feet black. Length when at rest twenty-two mil.; when crawling, 25 mil. Width in widest part, three mil. Food plants, the poison ivy (*Rhus toxicodendron* Mx.), and the spice bush (*Lindera Benzoin* Meis). Pupated September 16, in a folded leaf. Imago May 21.

L. W. Goodell, Amherst.

NEW LOCALITIES FOR BUTTERFLIES. July 22d I saw a specimen of *Limenitis arthemis* Drury on the side of a mountain ravine, and on September 5th, one of *Papilio cresphontes*, Cram. in an open field. I did not succeed in capturing either, but had good views of both and have no doubt of their being these species. Both were fresh specimens, *cresphontes* especially, seeming to be just from the chrysalis. *L. Arthemis* must be exceedingly rare in this section, and I believe this is the first specimen of *cresphontes* reported in this state. L. W. GOODELL, Amherst, Mass.

STRETCH'S BOMBYCIDÆ OF NORTH AMERICA. Under date of June 20th DR. H. A. HAGEN, writes from Portland, Oregon, "In San Francisco I saw the plates for Stretch's new work on the Bombycidæ. They are really splendid, and the photoliphography admirably executed. I was so much interested in Stretch's work, and in the author himself, that I urged him to join our party, and was very glad when he decided to do so. I really believe that his work will be a great step to a better understanding of the Bombycidæ, the more so as Stretch has an excellent knowledge of the larvæ of many species. I think also that many spurious species will be eliminated and brought together."

CERATOCAMPA REGALIS AT SUGAR. I had a remarkable experience last evening. I was sugaring a small wood close to my garden with poor success, when, lo! upon the trunk of a small ash tree was a splendid *C. regalis*, sipping the sugar with all the enjoyment of a *Catocala*. I had no net and only a small cyanide bottle, so I gazed in astonishment and despair for a few seconds, when it leisurely fluttered away. It is known that this species is attracted by sweets?
DAVID BRUCE, Brockport, New York, August 4, 1882.

MOTHS AND BUTTERFLIES OF MONROE COUNTY, NEW YORK. Butterflies have been very late and scarce this season, *D. Archippus* not having as yet appeared (August 4th) and only a few *P. Rapæ* and *C. Philodice* having been seen. One very light *Pieris Protodice* was taken last week. This species was very common here in September of last year. I took forty larvæ of *M. Phæton* on June 1st. They fed on almost any low plant or shrub, many of them on *Typha Latifolia*, but they appeared to prefer *Lonicera*, and in confinement *Plantago*. I raised thirty-one examples. The remainder were stung by parasites, but kept on feeding two weeks longer than the healthy subjects. *Pap. Cresphontes* has occurred this season in abundance, though previous to 1880 it was almost unknown in this neighborhood. In that year a lady bred a fine ♀ from a larva found in the garden on *Dictamnus fraxinella*, and last year I discovered larvæ feeding on garden rue, *Ruta graveolens*. This year it has been seen in great numbers. I have taken seventy larvæ feeding on Prickly Ash, have reared all to the chrysalis, whence they are now emerging in beautiful condition. Yesterday I had the pleasure of seeing on the windows of my "Vivarium" living bred specimens of all the species of *Papilio* found in this district. viz.: *Ajax*, *Turnus*, *Troilus*, *Asterias* and *Cresphontes*. The last named species appears to be entirely free from parasites, not a single example that I have found being stung. DAVID BRUCE, Brockport, New York.

ANISOTA SENATORIA, Smith-Abbott. During the past summer this moth was very prevalent in Columbia County, New York. It made its appearance at Oak Hill, the residence of Mr. Hermon T. Livingston, in the township of Livingston in the latter part of June, and before the middle of August the larvæ had consumed the leaves of all the young oaks, the older trees not escaping severe spoliation. I observed that the oaks in the woods adjoining the place were not attacked, but that the trees skirting the forest suffered as badly as those upon the lawn, and were nearly stripped of their leaves. In the early season I destroyed myriads of the insects in the grasses under the oaks, just after pupation, and also some five thousand eggs soon after deposition; but notwithstanding these precautions against a damaging visitation, severe disfigurement, if not injury, to the oaks resulted from the insatiable larvæ. A very

close observation of the habits of this moth has led me to determine that they can readily be exterminated from oaks situated in a lawn by trimming up the lower branches. The moths pair in the grass under the oaks very shortly after pupation, and as the wings of the female are small in proportion to the size of her body, she is unable to make a very extended flight. The eggs as discovered by me were attached to the underside of the leaves at the terminal twigs of all the branches nearest the ground, the branches at an elevation of twelve or fifteen feet not showing a single deposit.

FREDERICK CLARKSON, New York City, December 1st, 1882.

ALETIA ARGILLACEA HUBN.—This moth appeared at sugar October seventh and eighth at Karner (formerly Centre), N. Y. October seventh, four examples were taken, one of which was crippled and not able to fly and was crawling up a tree to taste the sugared bait. October eight, twelve examples were captured, one of which had just emerged from chrysalis and was not fully developed. It was leisurely climbing a sugared tree shaking out its wings in the act of development. It was allowed to remain until its wings were fully expanded and hardened, when it too fell a victim to the cyanide bottle. As I have not kept a record of all the moths captured at sugar previous to the month of October this year, I cannot say positively whether I have taken *Aletia* earlier in the season. I have, however, captured them at sugar every autumn since 1877. The weather after the seventh and eighth turned cold and stormy, consequently I did not again sugar until October 12th, but no more of this species have been captured since. The moth is taken with *Glaea*, *Lithophane* and *Scopelosoma* all of which are known to hybernate. May not the *Aletia* also pass the winter in this manner? This is an interesting subject for consideration. The specimens captured were all of them bright and fresh, and apparently had very recently come forth. I am convinced that the moth breeds in this latitude, and that its larvæ feed on some *Malvaceous* plant. I think that the facts set forth clearly prove that the present brood have not emigrated from a more southern latitude.—JAMES S. BAILEY, M.D. Albany, N. Y., Oct. 25, 1882.

FENNARIA SEVORSA. Gr.—This species must be known as *Phægarista Sevorsa*. I have just discovered that it belongs to this East Indian genus, the occurrence of which, in North America, is extraordinary. Having but one type, which I could not denude, I failed to study the neuration and mistook the position of the species, which is quite distinct from its old-world congener.

A. R. GROTE.

NOTICE TO SUBSCRIBERS. The present number concludes the second volume. The index and title page will be issued shortly. Intending subscribers to Volume III., 1883, are requested to forward their names to the editor as early as possible.

ERRATUM. On p. 139. Pamphila Python ♀ should be P. Python ♂.

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ERRATA.

Page	3,	line 22,	for "indviduals" read "individuals."
"	4,	" 23,	add "t" to the first word of the line.
"	6,	" 31,	for "courses" read "causes."
"	30,	" 31,	read "Grapta Silenus."
"	30,	" 42,	read "Argynnis."
"	30,	" 43,	read "Argynnis."
"	33,	" 8,	second column, for "Sambuscus" read "Sambucus."
"	35,	" 17,	for "Mentries" read "Menetries."
"	44,	" 7,	for "Danopolis" read "Demopolis."
"	44,	" 29 and 31,	for "synonym" read "synonomy."
"	54,	" 37,	read "as wide at base as the thorax."
"	66,	" 57,	first column, read "rare, one ♀."
"	71,	" 1,	first column, read "Heterophleps."
"	71,	" 14,	first column, read "Deilinea."
"	93,	" 47,	read "was detected" for "were detected."
"	94,	" 9,	read "After the imagines emerge."
"	97,	" 2,	for "patustris" read "palustris."
"	97,	" 43,	for "seem" read "seems."
"	98,	" 22,	after "internal margin" add a comma.
"	98,	" 29,	for "Querci" read "Quercus."
"	99,	" 30,	for "oblinata" read "oblinita."
"	101,	" 13,	for "Cerussaria" read "obrussaria."
"	139,	" 17,	for "1 ♀" read "1 ♂."
"	161,	"	lines in foot note, the "o" displaced—last line read "Turnus."
"	164,	" 38,	for "Orgyvia" read "Orgyia."
"	186,	" 23,	for "semi-flarea" read "semi-flava."
"	188,	" 12,	for "photoliphography" read "photolitography."

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